HEWLETT hp PACKARD

HP-65

FINANCE PAC 1

JANUARY, 1975

The program material contained herein is supplied without representation or warranty of any kind. Hewlett-Packard Company therefore assumes no responsibility and shall have no liability, consequential or otherwise, of any kind arising from the use of this program material or any part thereof.

PRINTED IN U.S.A. © HEWLETT-PACKARD, 1974

INTRODUCTION

Your HP-65 Finance Pac I contains 38 programs on 40 magnetic cards that address frequently encountered problems in many areas of personal and business finance. Calculations for loans, savings, annuities, investment analysis, depreciation, business statistics, leases, and other applications are included.

An important design criterion for these programs was the requirement that they should not simply solve important problems but should also be easy to use in the business environment. Our pleasant experiences with the HP-80 and HP-81 business/finance calculators contributed many useful features in this respect. Data can generally be entered in any sequence and data reentry requirements have been minimized so that, when evaluating alternatives, only values that change need to be keyed in for each new case. Industry conventions were observed, and programs with a common thread operate similarly. The result of these efforts is that you can quickly begin to use your HP-65 to assist in making financial decisions after learning only a few fundamentals, such as how to enter a prerecorded program.

The programs are fully documented for the bulk of envisioned usage in the section titled Program Instructions. Here there are diagrams, descriptions, operating instructions, and one or more sample problems with solutions for each program. Additional important, but less frequently referenced, material is presented in the Appendices. An easily accessed summary of principal label conventions is available immediately after the Table of Contents.

To acquaint yourself with Finance Pac I we suggest that you first turn to the program instructions of a program that interests you, select the appropriate magnetic card and try the sample problems shown. Next, familiarize yourself with the information available in the Appendices, and then try a few of your "real world" problems.

We hope you find the HP-65 Finance Pac 1 a useful tool, and welcome your comments, requests, and suggestions—these are our most important source of future user-oriented programs.

TABLE OF CONTENTS

Appendices

LABEL CONVENTIONS, PROGRAMS 1 THROUGH 17

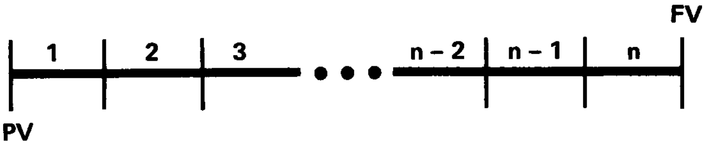
The labels and associated information summarized in the table below apply to programs 1 through 17. Additional information appears in the individual program instructions and in Appendix D.

LABEL	KEY	INPUT/OUTPUT VALUE	REGISTER
n	A	total number of periods	1
i	B	periodic interest rate expressed as a percent.	2*
PMT	C	periodic payment amount; may occur at the beginning or end of payment periods depending on the problem.	3
PV	D	present value occurring at the beginning of first period.	4
FV**	E	future value occurring at the end of the last period.	5
BAL**	E	balloon payment amount or remaining balance occurring at the end of the last period.	5

*The periodic interest rate is stored as a decimal value.

**FV and BAL never appear in the same program.

COMPOUND AMOUNT



Description:

Given values for any three of the four variables (n, i(%), PV or FV) COMPOUND AMOUNT will calculate a value for the remaining variable.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in 3 of the following:			
	• number of compounding			
	periods	n	A	0.00
	• periodic interest rate	i (%)	B	0.00
	• present value	PV	D	0.00
	• future value	FV	E	0.00
3	Calculate the remaining variable:			
	• number of compounding			
	periods		A	n
	• periodic interest rate		B	i (%)
	• present value,		D	PV
	• future value		E	FV
4	For a new case go to step 2 and			
	change the appropriate values.			

Examples

Problem Statement:

If $155 is placed in a savings account paying 5¾% compounded monthly, what sum of money will be in the account at the end of 9 years?

Keystrokes	See Displayed
155 [D] →	0.00
5.75 [ENTER↑] 12 [÷] [B] →	0.00
9 [ENTER↑] 12 [×] [A] →	0.00
[E] →	259.74

Problem Statement:

Assume that the previous calculation has just been performed as shown. Determine the sum that will be in the account at the end of 5 years, if all other values are unchanged.

Keystrokes	See Displayed
5 [ENTER↑] 12 [×] [A] →	0.00
[E] →	206.49

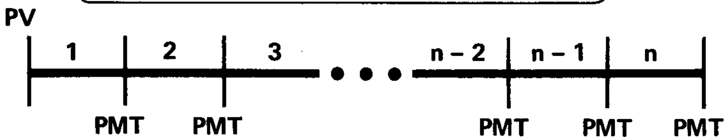
Problem Statement:

A house purchased 11 years ago for $25,000 is now worth $22,000. What annual appreciation/depreciation rate does this represent?

Keystrokes	See Displayed
11 [A] →	0.00
25000 [D] →	0.00
22000 [E] →	0.00
[B] →	–1.16

(annual depreciation rate of 1.16%)

DIRECT REDUCTION LOAN
SOLVE FOR n, PMT, OR PV



Description:

Given the periodic interest rate (i) and values for two other variables (n, PMT, or PV) this program will calculate a value for the remaining variable.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in				
	•periodic interest rate	i (%)	B		0.00
	and two of the following:				
	•number of payment periods	n	A		0.00
	•periodic payment amount	PMT	C		0.00
	•loan amount (present value)	PV	D		0.00
3	Calculate the remaining variable				
	•number of payment periods		A		n
	•periodic payment amount		C		PMT
	•loan amount (present value)		D		PV
4	For a new case go to step 2				
	and change the appropriate				
	values				

Examples

Problem Statement:

What is the monthly payment required to fully amortize a 30 year, $30,000 mortgage if the annual percentage rate is 9%?

Keystrokes	See Displayed
30 [ENTER↑] 12 [×] [A] ——→	0.00
30000 [D] ——→	0.00
9 [ENTER↑] 12 [÷] [B] ——→	0.00
[C] ——→	241.39

Problem Statement:

Having just performed the previous calculation the realtor is delighted since his client feels he can afford $250 per month. Without changing the term or interest rate the agent would like to determine the largest loan amount that this payment would amortize.

Keystrokes	See Displayed
250 C →	0.00
D →	31070.47

Problem Statement:

Roy Martin is considering a junior mortgage that has 60 remaining monthly payments of $148.73. How much should Roy pay for this "second" mortgage if he requires a 12.5% annual yield rate and assuming the mortgage is not prepaid?

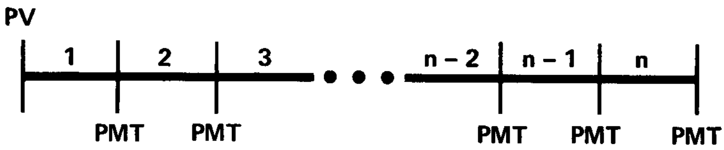
Keystrokes	See Displayed
60 A 148.73 C 12.5 [ENTER↑] 12 [÷] B D →	6610.83

Problem Statement:

Intending to establish a fixed term annuity for himself, Dennis York placed $25,000 in a savings account paying 5% compounded quarterly. At the end of each quarter he will be withdrawing $1200. How many withdrawals will Dennis be able to make?

Keystrokes	See Displayed
25000 D →	0.00
5 [ENTER↑] 4 [÷] B →	0.00
1200 C →	0.00
A →	24.28 (about 24 withdrawals)
4 [÷] →	6.07 (or a little over 6 years)

DIRECT REDUCTION LOAN
SOLVE FOR i



Description:

This program calculates the periodic interest rate (i) given values for the other three variables (n, PMT, PV).

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following:			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• loan amount (present value)	PV	D	
3	Calculate periodic interest rate		B	i (%)
4	For a new case go to step 2			
	and change the appropriate			
	values			

Examples

Problem Statement:

Maureen Paris has a $56,000 loan requiring 300 monthly payments of $432.22. What annual interest rate does this represent?

Keystrokes	See Displayed
56000 [D] 300 [A] 432.22 [C] [B] →	0.67
	(.67% is the monthly interest rate)
12 [×] →	8.00
	(8% annual interest rate)

Problem Statement:

A mortgage with quarterly payments of $2,115.21 will be fully amortized in 12 years. If the mortgage can be purchased for $56,000 and the loan is not prepaid, what annual yield rate does this investment opportunity represent?

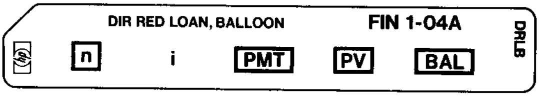
Keystrokes	See Displayed
2115.21 [C] 12 [ENTER↑] 4 [×] [A] 56000 [D] [B] →	2.75
	(this is the quarterly rate)
4 [×] →	11.00
	(11% is the annual yield rate)

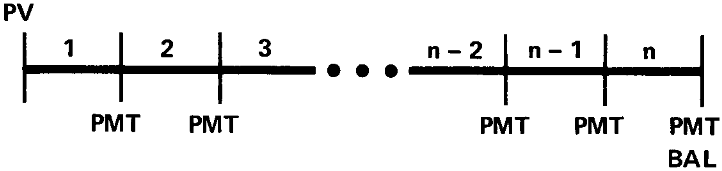
Problem Statement:

A fixed term annuity is available which requires a $35,000 initial deposit. In return the depositor will receive monthly payments of $231 for 20 years. What annual interest rate is being applied?

Keystrokes	See Displayed
35000 [D] 231 [C] 20 [ENTER↑] 12 [×] [A] [B] →	.42
	(.42% monthly)
12 [×] →	5.00
	(5% annual interest rate)

DIRECT REDUCTION LOAN WITH BALLOON PAYMENT SOLVE FOR n, PMT, PV, OR BAL





Description:

Given the periodic interest rate (i) and values for three other variables (n, PMT, PV or BAL) this program will calculate a value for the remaining variable.

When entering the periodic interest rate with the **B** key an intermediate calculation may cause a display of all 9's instead of zero. No damage has been done however. Simply press [CLX] and continue operations.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• periodic interest rate	i (%)	B	0.00
	and three of the following:			
	• number of payment periods	n	A	0.00
	• periodic payment amount	PMT	C	0.00
	• loan amount (present value)	PV	D	0.00
	• balloon payment or remain-			
	ing balance at the end of			
	period n	BAL	E	0.00
3	Calculate the remaining			
	variable:			
	• number of payment periods		A	n
	• periodic payment amount		C	PMT
	• loan amount (present value)		D	PV
	• balloon payment or remain-			
	ing balance at the end of			
	period n		E	BAL

Examples

Problem Statement:

Two individuals are constructing a loan with a balloon payment. The loan amount is $3,600 and it is agreed that the annual interest rate will be 10% with 36 monthly payments of $100. What balloon payment amount, to be paid coincident with the 36th payment, is required to fulfill the loan agreement?

Keystrokes	See Displayed
3600 [D] 10 [ENTER↑] 12 [÷] [B] 36 [A] 100 [C] [E] →	675.27

Problem Statement:

A company intends to pay off its 6% long term loan of $1,000,000 and semi-annual payments of $68,000 when the remaining balance is $500,000. When will the remaining balance be this amount?

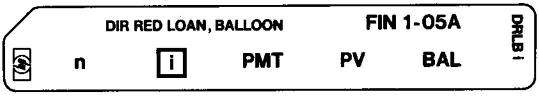
Keystrokes	See Displayed
6 [ENTER↑] 2 [÷] [B] 1000000 [D] 68000 [C]	
500000 [E] [A] →	11.26
	(11.26 semi-annual periods from the beginning)
2 [÷] →	5.63
	(almost 6 years from the start of the loan)

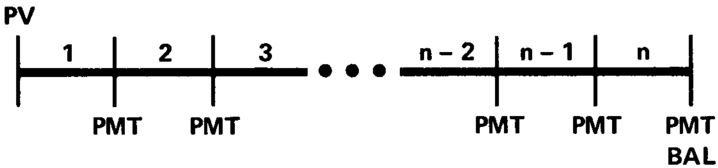
Problem Statement:

An investor is considering buying an 8%, $52,000 mortgage. Monthly payments are $402, and it is assumed that this mortgage will be prepaid in 11 years. What should the investor pay for this mortgage if he requires a 10% yield on his investments?

Keystrokes	See Displayed
8 [ENTER↑] 12 [÷] [B] 52000 [D] 402 [C] →	0.00
11 [ENTER↑] 12 [×] [A] [E] →	40347.88
	(This is the remaining balance at the end of 11 years)
10 [ENTER↑] 12 [÷] [B] [D] →	45600.94
	(He should pay $45,600.94 to achieve a yield of 10%)

DIRECT REDUCTION LOAN WITH BALLOON PAYMENT SOLVE FOR i





Description:

This program will calculate the periodic interest rate (i) given values for the other four variables (n, PMT, PV, and BAL)

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following:			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• loan amount (present value)	PV	D	
	• remaining balance or			
	balloon payment at the end			
	of period n	BAL	E	
3	Calculate the periodic interest			
	rate		B	i (%)
4	For a new case go to step 2			
	and change the appropriate			
	values			

Examples

Problem Statement:

Find the annual interest rate on a $2,100 loan requiring 24 monthly payments of $42.52 and a balloon payment of $1,500 due coincident with the 24th payment.

Keystrokes	See Displayed
2100 [D] 24 [A] 42.52 [C] 1500 [E] [B] ——→	0.96 (.96% monthly interest rate)
12 [×] ——→	11.53 (11.53% annual interest rate)

Problem Statement:

Assume that the above calculation has just been performed, and it is discovered that the balloon payment of $1,500 occurs one month after the last monthly payment (i.e., end of month 25). What is the annual interest rate if all other values remain the same?

Keystrokes	See Displayed
1500 [ENTER↑] 42.52 [−] [E] ——→	1457.48
25 [A] [B] 12 [×]	11.19

Notes:

(1) This program assumes that there are n equal payments with a BAL payment coincident with the last payment. Therefore, to accommodate the above example, and without changing the actual problem, the data was restructured to "look like" 25 equal payments of 42.52 and a balloon payment of 1457.48.

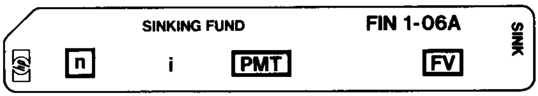
(2) The balloon payment of $1500 could have been recalled from register 5, and the periodic payment of 42.52 could have been recalled from register 3.

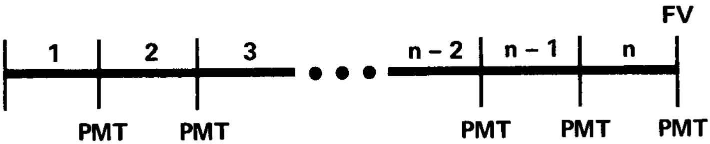
Problem Statement:

A piece of income property can be purchased for an equity investment of $200,000 and a mortgage on the remainder. It is estimated that this investment will generate an annual net cash flow (after operating expenses and debt service) of $12,000. The property will be sold after 6 years, and the net proceeds from the sale are projected to be $300,000. What is the projected annual yield or rate of return for this investment?

Keystrokes	See Displayed
200000 [D] 12000 [C] 6 [A] 300000 [E] [B] ——→	12.14

SINKING FUND
SOLVE FOR n, PMT OR FV





Description:

Given the periodic interest rate (i) and values for two other variables (n, PMT, or FV) this program will calculate a value for the remaining variable.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• periodic interest rate	i (%)	B	0.00
	and two of the following:			
	• number of payment periods	n	A	0.00
	• periodic payment amount	PMT	C	0.00
	• future value	FV	E	0.00
3	Calculate the remaining			
	variable:			
	• number of payment periods		A	n
	• periodic payment amount		C	PMT
	• future value		E	FV
4	For a new case go to step 2			
	and change the appropriate			
	values			

Examples

Problem Statement:

A corporation has determined that a certain piece of equipment costing $50,000 will be required in 3 years. Assuming a fund paying 7% compounded quarterly is available, what quarterly payment amount must be placed in the fund in order to cover this cost if savings are to start at the end of this quarter?

Keystrokes	See Displayed
50000 [E] 3 [ENTER↑] 4 [×] [A]	
7 [ENTER↑] 4 [÷] [B] [C] ——→	3780.69

Problem Statement:

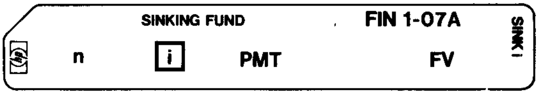
Implementation of a new process will save a company $12,000 a year in manufacturing costs for a product that will continue to be manufactured for about 5 years. If the company uses 6% as the "cost of capital" what will be the value of these savings at the end of the product's life?

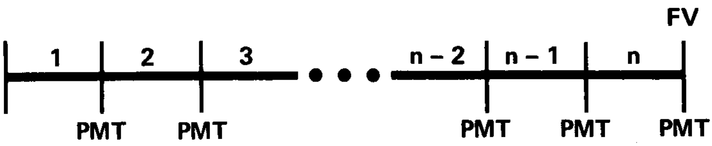
Keystrokes	See Displayed
12000 [C] 5 [A] 6 [B] [E] ——→	67645.12 (future value of the savings will be $67,645.12)

Note:

Program 2 could be used to determine the present value of these savings..

SINKING FUND
SOLVE FOR i





Description:

This program will calculate the periodic interest rate (i) given values for the other three variables (n, PMT, and FV).

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• future value	FV	E	
3	Calculate periodic interest rate		B	i (%)
4	For a new case go to step 2 and			
	change the appropriate values			

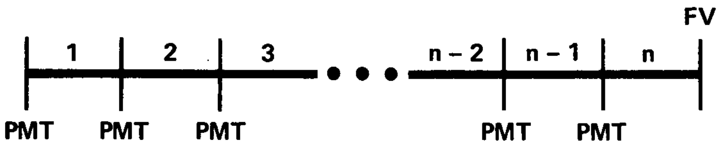
Example

Problem Statement:

Participation in a fund is being offered, whereby the investor is required to pay $180 at the end of the first month and every month thereafter for 15 years. At the end of that time he will receive a lump sum payment of $45,000. What annual interest rate will the investor realize from this fund?

Keystrokes	See Displayed
180 [C] 15 [ENTER↑] 12 [×] [A] 45000 [E] [B] ——→	.35 (.35% monthly rate)
12 [×] ——→	4.19 (an annual interest rate of 4.19%)

PERIODIC SAVINGS, ANNUITY DUE
SOLVE FOR n, PMT OR FV



Description:

Given the periodic interest rate (i) and values for two other variables (n, PMT, or FV) this program will calculate a value for the remaining variable.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• periodic interest rate	i (%)	B	0.00
	and two of the following:			
	• number of payment periods	n	A	0.00
	• periodic payment amount	PMT	C	0.00
	• future value	FV	E	0.00
3	Calculate the remaining			
	variable:			
	• number of payment periods		A	n
	• periodic payment amount		C	PMT
	• future value		E	FV
4	For a new case go to step 2			
	and change the appropriate			
	values			

Examples

Problem Statement:

Mr. Columbus has his eye on a sail boat costing $5,650. Starting now he intends to deposit $120 per month in a savings account paying 5½% compounded monthly. How long will it take him to accumulate the price of the boat?

Keystrokes	See Displayed
5650 [E] 120 [C] 5.5 [ENTER↑] 12 [÷] [B] [A] ⟶	42.55 (almost 43 months)
12 [÷] ⟶	3.55 (or about 3½ years)

Problem Statement:

It has been determined that $15,000 will be required to send a son to college 13 years from now. A savings plan paying 7% compounded quarterly is available. If deposits start at the beginning of the next quarter what equal quarterly payments should be made in order to accrue the desired amount?

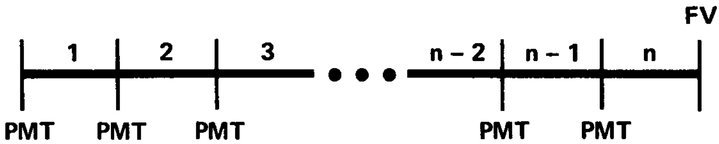
Keystrokes	See Displayed
15000 [E] 13 [ENTER↑] 4 [×] [A]	
7 [ENTER↑] 4 [÷] [B] [C] ⟶	176.12

Problem Statement:

Having just performed the above calculation the parent would like to calculate the sum that would be accumulated if the quarterly payments were increased to $180.

Keystrokes	See Displayed
180 [C] [E] ⟶	15330.66

PERIODIC SAVINGS, ANNUITY DUE
SOLVE FOR i



Description:

This program calculates the periodic interest rate (i) given values for the other three variables (n, PMT, and FV).

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following:			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• future value	FV	E	
3	Calculate the periodic interest			
	rate		B	i (%)
4	For a new case go to step 2			
	and change the appropriate			
	values			

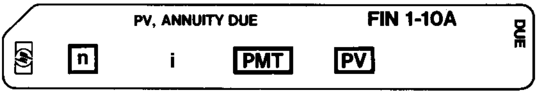
Examples

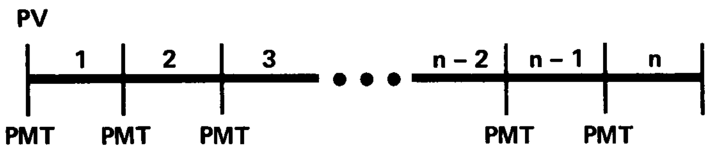
Problem Statement:

An individual planning future needs has determined that he will require $10,000 in 15 years. All he feels he can afford towards this goal is $25 per month. What annual interest rate must a savings or investment plan offer if he is to achieve this goal?

Keystrokes	See Displayed
10000 [E] 15 [ENTER↑] 12 [×] [A] 25 [C] [B] ——→	.79 (.79% monthly interest)
12 [×] ——→	9.52 (an annual interest rate of 9.52% is required)

PRESENT VALUE, ANNUITY DUE
SOLVE FOR n, PMT, OR FV





Description:

Given the periodic interest rate (i) and values for two other variables (n, PMT, or PV) this program will calculate a value for the remaining variable.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• periodic interest rate	i (%)	B	0.00
	and two of the following:			
	• number of periodic pay-			
	ments	n	A	0.00
	• periodic payment amount	PMT	C	0.00
	• present value	PV	D	0.00
3	Calculate the remaining			
	variable:			
	• number of periodic pay-			
	ments		A	n
	• periodic payment amount		C	PMT
	• present value		D	PV
4	For a new case go to step 2			
	and change the appropriate			
	variables			

Examples

Problem Statement:

The owner of a piece of equipment presently worth $70,000 intends to lease the equipment for 5 years. He estimates that the equipment will have no residual (salvage) value at the end of the lease and he desires a 7% annual yield. What should he establish as the quarterly payment assuming payments are made at the beginning of each quarter?

Keystrokes	See Displayed
70000 [D] 5 [ENTER↑] 4 [×] [A]	
7 [ENTER↑] 4 [÷] [B] [C] ⟶	4106.52

Problem Statement:

The owner in the previous problem has reason to believe that his prospective customer would prefer a lower payment and a longer term. What is the payment if the lease is for a 6 year period?

Keystrokes	See Displayed
6 [ENTER↑] 4 [×] [A] [C] ⟶	3535.13

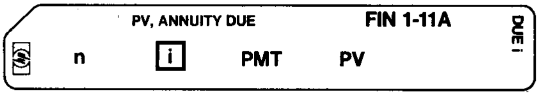
Problem Statement:

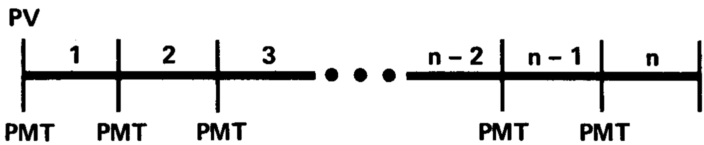
A firm can purchase a piece of equipment from Company Z for $30,000. Alternatively the company can acquire the equivalent machinery from Company Y with a conditional sales contract requiring 8 semi-annual payments of $4,200. The first payment is due when the contract is signed. If the firm uses a 9% "cost of capital" assumption, which alternative is least expensive?

Keystrokes	See Displayed
8 [A] 4200 [C] 9 [ENTER↑] 2 [÷] [B] [D] ⟶	28949.34

The present value of Company Y's offer is $28,949.34 and this is less expensive than Company Z's purchase price.

PRESENT VALUE, ANNUITY DUE
SOLVE FOR i





Description:

This program will calculate the periodic interest rate (i) given values for the other three variables (n, PMT, and PV).

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following:			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• present value	PV	D	
3	Calculate the periodic interest			
	rate		B	i (%)
4	For a new case go to step 2			
	and change the appropriate			
	values			

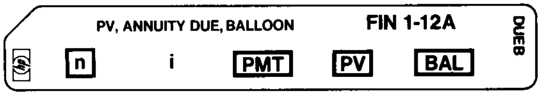
Example

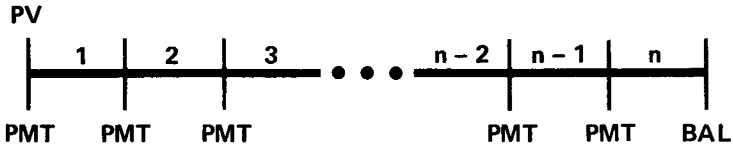
Problem Statement:

Competitive conditions suggest that $340 per month is the most a manufacturer could expect the market to bear on a standard 4 year lease for a particular product. If the total cost to produce and sell the product is $13,000 what will the annual yield rate be under these conditions? (The product will have no residual value at the end of the lease.)

Keystrokes	See Displayed
340 [C] 4 [ENTER↑] 12 [×] [A] 13000 [D] [B] ——→	1.01 (1.01% monthly yield)
12 [×] ——→	12.17% (an annual yield of 12.17%)

PRESENT VALUE ANNUITY DUE, WITH BALLOON PAYMENT SOLVE FOR n, PMT, PV, OR BAL





Description:

Given the periodic interest rate (i) and values for three other variables (n, PMT, PV, or BAL) this program will calculate a value for the remaining variable.

When entering the periodic interest rate with the **B** key an intermediate calculation may cause a display of all 9's instead of zero. No damage has been done however. Simply press CLX and continue operations.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• periodic interest rate	i (%)	B	0.00
	and three of the following:			
	• number of payment periods	n	A	0.00
	• periodic payment amount	PMT	C	0.00
	• present value	PV	D	0.00
	• balloon payment at the end			
	of period n	BAL	E	0.00
3	Calculate the remaining variable			
	• number of payment periods		A	n
	• periodic payment amount		C	PMT
	• present value		D	PV
	• balloon payment at the end			
	of period n		E	BAL
4	For a new case go to step 2 and			
	change the appropriate			
	variables			

Examples

Problem Statement:

A "third party" leasing firm is considering the purchase of a mini-computer priced at $63,000 and intends to achieve a 13% annual yield by leasing the computer to a customer for a 5 year period. Ownership is retained by the leasing firm, and at the end of the lease they expect to be able to sell the equipment for at least $10,000. What should they establish as the monthly payments in order to realize their desired yield?

Keystrokes	See Displayed
63000 [D] 13 [ENTER↑] 12 [÷] [B] 5 [ENTER↑] 12 [×] [A] 10000 [E] [C] ——→	1300.16

Problem Statement:

The $1,300.16 monthly lease payment calculated in the previous problem is thought to be too much. What would the resale value have to be at the end of five years if the monthly payments were reduced to $1,200?

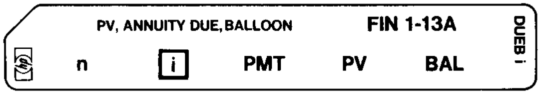
Keystrokes	See Displayed
1200 [C] [E] ——→	18494.00

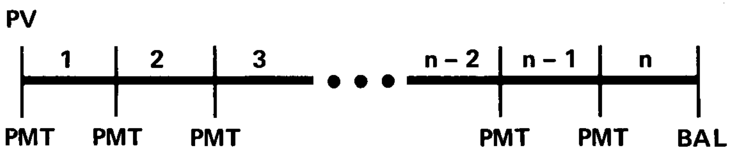
Problem Statement:

The leasing firm of the two previous examples is not yet satisfied. A resale value of $18,494 five years from now is considered to be too high. In fact, $14,000 is the largest resale value that they are willing to plan on. With a $14,000 resale value, and leaving the monthly payments at $1,200 and the yield rate at 13% what purchase price will they have to negotiate in order to satisfy their requirements?

Keystrokes	See Displayed
14000 [E] [D] ——→	60645.71

PRESENT VALUE ANNUITY DUE WITH BALLOON PAYMENT SOLVE FOR i





Description:

This program will calculate the periodic interest rate (i) given values for the other four variables (n, PMT, PV and BAL).

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in all of the following:			
	• number of payment periods	n	A	
	• periodic payment amount	PMT	C	
	• present value	PV	D	
	• balloon payment at the end			
	of period n	BAL	E	
3	Calculate the periodic interest			
	rate		B	i (%)
4	For a new case go to step 2 and			
	change the appropriate			
	values.			

Examples

Problem Statement:

A local truck dealer is offering to lease an $80,000 off-highway diesel truck for 5 years and monthly payments of $1,625. In addition the customer may acquire ownership by exercising a 10% purchase option ($8,000 in this case) at the end of the lease. What annual yield rate is the dealer achieving if the purchase option is exercised?

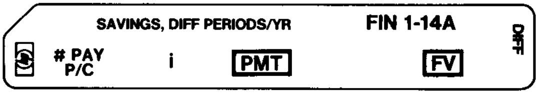
Keystrokes	See Displayed
80000 [D] 5 [ENTER↑] 12 [×] [A] 1625 [C]	
8000 [E] [B] →	.92 (.92% monthly rate)
12 [×] →	11.03 (an annual yield rate of 11.03%)

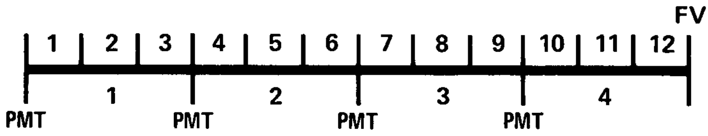
Problem Statement:

If the purchase option in the above example is not exercised, ownership will be retained by the dealer. The best estimate of the resale value of the truck at the end of the lease is $6,500. What is the yield for the dealer if the customer does not choose to exercise the purchase option?

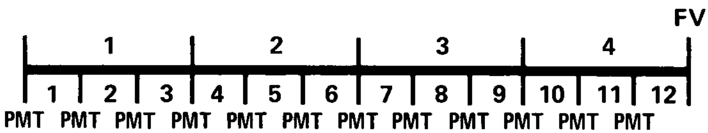
Keystrokes	See Displayed
6500 [E] [B] →	.88 (.88% monthly yield rate)
12 [×] →	10.56 (an annual yield rate of 10.56%)

SAVINGS–COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS





Quarterly Payments/Monthly Compounding



Monthly Payments/Quarterly Compounding

Description:

Payments into a savings plan may not occur with the same frequency as the compounding frequency offered. This program solves for either the periodic payment amount (given future value) or future value (given the payment amount).

The diagrams above depict two of the many combinations that may be encountered. Note that payments are assumed to occur of the beginning of payment periods (annuity due).

Another assumption of this program is that payments deposited for a partial compounding period will accrue simple interest for the remainder of the compounding period. Thus, a deposit at the beginning of the 2nd month of a quarter into a savings plan that compounds quarterly is assumed to accrue two months interest. This is often the case, but is not true for all institutions.

The unlabeled **D** key does not have the protective programming described on page 113 of appendix B. If pressed by mistake the user will not be alerted with blinking zeroes and stack register values will be lost. No other damage is done however, and the user can continue operations in sequence.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in total number of pay-				
	ments	# PAY	A		0.00
3	Key in the number of payment				
	periods per year	P	↑		
4	Key in the number of com-				
	pounding periods per year	C	÷	A	0.00
5	Key in				
	• periodic interest rate	i (%)	B		0.00
	and one of the following:				
	• periodic payment amount	PMT	C		0.00
	• final amount (future value)	FV	E		0.00
6	Calculate the remaining value				
	• periodic payment amount		C		PMT
	• final amount (future value)		E		FV
7	For new case: If any value in				
	steps 2, 3, or 4 are to be				
	changed then all must be input				
	beginning at step 2. If # PAY,				
	P, and C are unchanged go to				
	step 5 and change values as				
	required.				

Examples

Problem Statement:

Quarterly deposits of $95 are to be made into a savings account paying 5% compounded monthly. What amount will be in that account after 7 years (i.e., 28 total payments)?

Keystrokes **See Displayed**

7 [ENTER↑] 4 [×] [A] 4 [ENTER↑] 12 [÷] [A]

5 [ENTER↑] 12 [÷] [B] 95 [C] [E] ——→ 3203.59

Problem Statement:

Assuming the previous calculation has just been performed as shown, determine the future value if the quarterly payment amount were $100 instead of $95.

Keystrokes	See Displayed
100 [C] [E] ⟶	3372.20

Problem Statement:

Again assume the two previous calculations have just been performed, but the interest rate is changed to 6% and a future value of $6,000 is desired. Determine the quarterly payment amount required.

Keystrokes	See Displayed
6 [ENTER↑] 12 [÷] [B] 6000 [E] [C] ⟶	171.24

Problem Statement:

Deposits of $1500 per month are to be made into an account paying 7% compounded daily (365 days per year). What sum will be in the account after 1 year?

Keystrokes	See Displayed
12 [A] 12 [ENTER↑] 365 [÷] [A] 7 [ENTER↑]	
365 [÷] [B] 1500 [C] [E] ⟶	18699.33

NOMINAL TO EFFECTIVE/EFFECTIVE TO NOMINAL RATE CONVERSION

Decscription:

An annual effective interest rate demonstrates the *effect* of compounding for a full year of compounding periods at a particular periodic interest rate. The periodic interest rate to be used is determined by dividing the number of compounding periods in a year into the stated annual nominal interest rate. The effect is such that if the nominal rate is held constant, as the number of compounding periods per year is increased the annual effective interest rate will increase. The ultimate or upper limit in this process is to have an infinite number of compounding periods in a year, commonly called continuous compounding.

This card actually contains two independent programs. The first, associated with A, B, and C, addresses finite compounding, that is quarterly compounding, monthly compounding, etc. Given the number of compounding periods in a year and one of the rates (nominal or effective) the other rate can be calculated. If for example, you require the periodic interest rate for a calculation, given the effective rate, use this program to determine the annual nominal rate first. Dividing the nominal rate by the number of compounding periods in a year will give the required periodic interest rate.

The second program, associated with D and E, is for continuous compounding. Given either rate, the other can be calculated.

The most common and straightforward definition of effective interest rate has been implemented. Occasionally other definitions will be used and the results will not compare exactly with those calculated by these programs. For example, since the maximum annual nominal rate that savings institutions can offer is regulated by law, they may modify the process (also regulated) so that the effective rate is even higher (e.g., for daily compounding, the periodic rate may be divided by 360 and then compounding accomplished for 365 periods). It is important then, when attempting to match results, to understand the process employed.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Go to either step 3a				
	for finite compounding or				
	step 3b for continuous com-				
	pounding				
3a	Key in				
	• number of compounding				
	periods/year	C/YR	A		0.00
	and one of the following:				
	• annual nominal rate	NOM(%)	B		0.00
	• annual effective rate	EFF(%)	C		0.00
4a	Calculate the remaining rate				
	• annual nominal rate		B		NOM(%)
	• annual effective rate		C		EFF(%)
5a	Go to step 5b				
3b	Key in one of the following:				
	• annual nominal rate	NOM(%)	D		0.00
	• annual effective rate (for				
	continuous compounding)	EFF(%)	E		0.00
4b	Calculate the remaining rate				
	• annual nominal rate or		D		NOM(%)
	• annual effective rate (for				
	continuous compounding)		E		EFF (%)
5b	For new cases go to step 3a or				
	3b and change or input				
	appropriate values				

Examples

Problem Statement:

An investment with monthly cash flows (implying monthly compounding) is said to have an annual effective yield (interest rate) of 21%. What annual (nominal) yield and periodic yield does this represent?

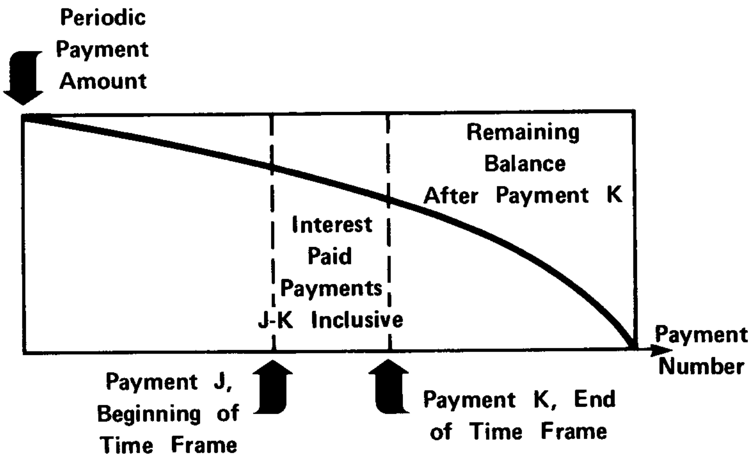
Keystrokes	See Displayed
12 [A] 21 [C] [B] →	19.21 (an annual nominal yield of 19.21%)
12 [÷] →	1.60 (a monthly yield of 1.60%)

Problem Statement:

A bank offers a savings plan with a 5% annual nominal interest rate. What is the annual effective rate if compounding is continuous?

Keystrokes	See Displayed
5 [D] [E] →	5.13 (an annual effective rate of 5.13%)

DIRECT REDUCTION LOAN ACCUMULATED INTEREST/REMAINING BALANCE



Description:

This program finds both the total interest paid over a specified number of payment periods and the remaining balance at the end of the last specified period, given the periodic interest rate, periodic payment amount, loan amount, and the beginning and ending payment numbers for the time span being considered. The payments associated with both the beginning (J) and the ending (K) payment period are included in the calculation.

The program can be used for loans with a balloon payment as well as loans arranged to be fully amortized provided two cautions are observed. First, the balloon payment of the loan must be at the same time as, and in addition to the last payment. Second, care should be taken not to enter a value for K that is after the last payment since the program has no way of knowing the term of the loan.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Key in		[ ] [ ]	
	• starting period number	J	[A] [ ]	
	• ending period number	K	[A] [ ]	
3	Key in		[ ] [ ]	
	• periodic interest rate	i (%)	[B] [ ]	
	• periodic payment amount	PMT	[C] [ ]	
	• initial loan amount	PV	[D] [ ]	
4	Compute the total interest paid		[ ] [ ]	
	between periods J and K		[ ] [ ]	
	inclusive		[E] [ ]	INT
5	Compute the remaining balance		[ ] [ ]	
	at the end of period K		[E] [ ]	BAL
6	New Cases: If either J or K		[ ] [ ]	
	change, both must be input at		[ ] [ ]	
	step 2. Values keyed in at		[ ] [ ]	
	step 3 are retained; only values		[ ] [ ]	
	that change must be keyed in.		[ ] [ ]	

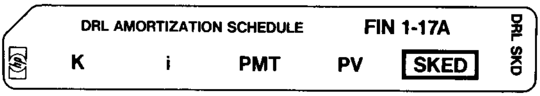
Example

Problem Statement:

A mortgage is arranged such that the first payment is made at the end of October, 1973 (i.e., October is payment period 1). It is a $20,000 loan at 7%, with monthly payments of $141.40. What is the accumulated interest for 1973 (periods 1–3) and 1974 (periods 4–15) and what would the remaining balance be at the end of each year?

Keystrokes	See Displayed
1 [A] 3 [A] 7 [ENTER↑] 12 [÷] [B] 20000 [D]	
141.40 [C] [E] ——→	349.57 (interest paid in 1973)
[E] ——→	19925.37 (remaining balance at the end of 1973)
4 [A] 15 [A] [E] ——→	1384.89 (interest paid in 1974)
[E] ——→	19613.46 (remaining balance at the end of 1974)

DIRECT REDUCTION LOAN AMORTIZATION SCHEDULE



Loan Amt: $30,000 Apr: 7% Monthly Payment: $200

Payment Number	Paid To Interest	Paid To Principal	Remaining Balance	Total Interest Paid To Date
1	175.00	25.00	29,975.00	175.00
2	174.85	25.15	29,949.85	349.85
36	169.36	30.64	29,001.75	6,201.75

Description:

Given the periodic interest rate (i), periodic payment amount, (PMT), loan amount (PV) and payment number (K) this program will generate the values for a loan amortization schedule as pictured above, starting with the payment number entered for K. (The schedule may be started at any desired payment number).

The data generated is valid for loans that have a balloon payment as well as those that are arranged to be fully amortized.

For loans with a balloon payment, the remaining balance of the last payment period is the balloon payment due in addition to the last periodic payment.*

For loans scheduled to be fully amortized, the remaining balance after the last payment period may be slightly more or less than zero. This is because the program assumes that *all* payments are equal to the value entered for PMT. In fact for most loans the last payment is slightly more or less than the rest.

*If only the balloon payment is to be calculated, program 4 should be used.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in				
	• first period of the desired				
	schedule (need not be 1)	K	A		
	• periodic interest rate	i (%)	B		
	• periodic payment amount	PMT	C		
	• initial loan amount	PV	D		
3	Calculate amount paid to				
	interest for period K		E		PMT to INT
4	Calculate amount paid to				
	principal for period K		E		PMT to PRIN
5	Calculate remaining balance				
	at the end of period K		E		BAL
6	Calculate total interest paid				
	between periods 1 to K				
	inclusive		E		TOT INT
7	Increment K for next period				
	and go to step 3 for next				
	period's values		E		K + 1
8	For new case go to step 2 and				
	change appropriate input values.				

Example

Problem Statement:

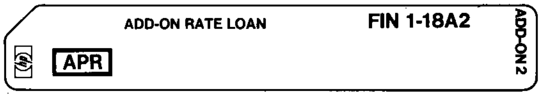
Generate an amortization schedule for the first two payments of a \$30,000, 7% mortgage having monthly payments of \$200. Then jump ahead and generate the data for the 36th payment. (Note that these answers are shown in the figure on the previous page).

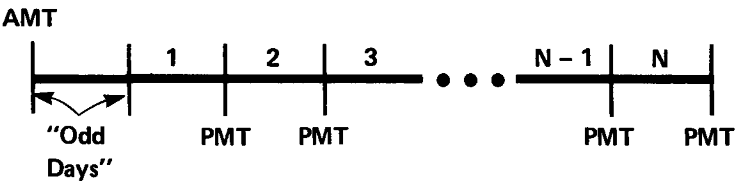
Keystrokes	See Displayed
1 A 7 ENTER↑ 12 ÷ B 200 C 30000 D E ⟶	175.00 (payment to interest)
E ⟶	25.00 (payment to principal)
E ⟶	29975.00 (remaining balance)

E ——→	175.00 (total interest to date)
E ——→	2.00 (starting 2nd period)
E ——→	174.85 (payment to interest)
E ——→	25.15 (payment to principal)
E ——→	29949.85 (remaining balance)
E ——→	349.85 (total interest to date)

Keystrokes	**See Displayed**
Now let's skip ahead to the 36th payment period.	
36 A E ——→	169.36 (payment to interest)
E ——→	30.64 (payment to principal)
E ——→	29001.75 (remaining balance)
E ——→	6201.75 (total interest to date)
E ——→	37.00 (starting 37th period)

ADD-ON RATE INSTALLMENT LOAN





Description:

This program calculates the monthly payment amount, total finance charge, and the Annual Percentage Rate (APR) for an add-on rate loan.

When a loan is initiated in the middle of a month the first payment is generally not required until the end of the first full month. The number of days from the beginning of the loan to the beginning of the first month (see above diagram) are called "odd days" and affect (decrease) the Annual Percentage Rate to be quoted with the loan. The calculation of the Annual Percentage Rate considers these odd days.

(See Appendix E for comments on iterative solutions.)

Note:
The payment amount (PMT) must be calculated in order to calculate the Annual Percentage Rate on card 2.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter card 1		[ ] [ ]	
2	Key in		[ ] [ ]	
	• number of monthly pay-		[ ] [ ]	
	ments	N	[A] [ ]	
	• "odd-days" to beginning of		[ ] [ ]	
	of first month (0-30)	ODD	[B] [ ]	
	• add-on interest rate	AIR (%)	[C] [ ]	
	• loan amount	AMT	[D] [ ]	
3	Calculate monthly payment		[E] [ ]	PMT
4	Optional—calculate total finance		[ ] [ ]	
	charge		[E] [ ]	FC
5	Enter card 2		[ ] [ ]	
6	Calculate the annual percentage		[ ] [ ]	
	rate		[A] [ ]	APR (%)

Example

Problem Statement:

A 36 month car loan for $3,500 with a 6% add-on rate is initiated such that there are 18 "odd days". Calculate the monthly payment required to amortize this loan, the total finance charge, and the annual percentage rate.

Keystrokes	See Displayed
Enter card 1	
36 **A** 6 **C** 3500 **D** 18 **B** **E** ——►	115.01 (monthly payment)
E ——►	640.36 (total finance charge)
Now enter card 2	
A ——►	10.89 (10.89% APR)

CONSTANT PAYMENT TO PRINCIPAL LOAN AMORTIZATION SCHEDULE

Loan Amount: $100,000 Term: 20 Years, Annual Payments
Annual Interest Rate: 8%
Constant Payment To Principal: $5,000

Payment Number (k)	Payment To Interest (INT_k)	Payment Amount (PMT_k)	Remaining Balance (BAL_k)	Total Interest To Date (INT_{1-k})
1	8,000.00	13,000.00	95,000.00	8,000.00
2	7,600.00	12,600.00	90,000.00	15,600.00

Description:

This type of loan is structured such that the principal is repaid in equal installments with the interest paid in addition. Therefore each periodic payment is different; it has a constant amount applied toward the principal and a decreasing amount towards interest.

This program calculates the values shown in the schedule above. The constant payment to principal required as input data (CPP) can be found by simply dividing the loan amount by the total number of payment periods.

The schedule may be started at any desired payment period; that is, the value entered for K need not be 1.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Key in		[ ] [ ]	
	• first period of the desired		[ ] [ ]	
	schedule (need not be 1)	K	[A] [ ]	
	• periodic interest rate	i (%)	[B] [ ]	
	• constant payment to princi-		[ ] [ ]	
	pal	CPP	[C] [ ]	
	• initial loan amount (present		[ ] [ ]	
	value)	PV	[D] [ ]	
3	Calculate payment to interest		[ ] [ ]	
	for period K		[E] [ ]	PMT to INT
4	Calculate total payment for		[ ] [ ]	
	period K		[E] [ ]	TOT PMT
5	Calculate remaining balance		[ ] [ ]	
	at the end of period K		[E] [ ]	REM BAL
6	Calculate total interest paid		[ ] [ ]	
	between periods 1 and K in-		[ ] [ ]	
	clusive		[E] [ ]	TOT INT
7	Display next period and go to		[ ] [ ]	
	step 3 for next period's values		[E] [ ]	K + 1
8	For new case go to step 2 and		[ ] [ ]	
	change appropriate values		[ ] [ ]	

Example

Problem Statement:

A twenty year, 8% loan for $100,000 is being amortized by annual payments to principal of $5,000 plus interest on the remaining balance. Generate an amortization schedule for this loan. (See the schedule shown on the previous page.)

Keystrokes	See Displayed
1 [A] 8 [B] 5000 [C] 100000 [D] [E] →	8000.00 (1st year's payment to interest)
[E] →	13000.00 (total 1st payment)

E ——————→ 95000.00
(remaining balance)

E ——————→ 8000.00
(total interest paid to date)

E ——————→ 2.00

(Now starting 2nd period)

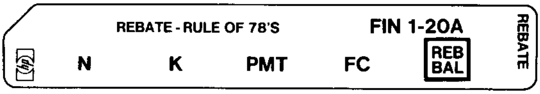
E ——————→ 7600.00
(2nd year's payment to interest)

E ——————→ 12600.00
(total 2nd payment)

E ——————→ 90000.00
(remaining balance)

E ——————→ 15600.00
(total interest paid to date)

INTEREST REBATE–RULE OF 78'S



Description:

This program calculates the unearned interest (rebate) as well as the remaining principal balance due for a prepaid consumer loan using the rule of 78's.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key-in all of the following:			
	• total number of monthly			
	payments	N	A	
	• number of the last payment			
	made	K	B	
	• monthly payment amount	PMT	C	
	• total finance charge	FC	D	
3	Calculate the unearned interest			
	(Rebate)		E	REB
4	Calculate the remaining balance		E	BAL
5	For a new case go to step 2			
	and change appropriate inputs.			

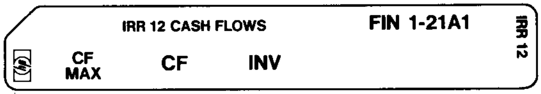
Example

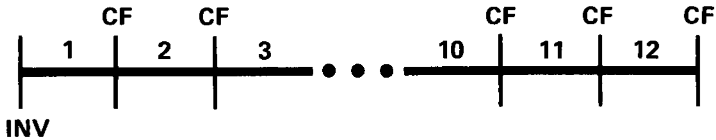
Problem Statement:

A $1000 loan, with a total finance charge of $180.00 is being paid at $39.33 per month for 30 months. What is the unearned interest and remaining balance after the 25th payment?

Keystrokes	See Displayed
180 D 39.33 C 30 A 25 B E ⟶	5.81 (unearned interest for payments 26 to 30)
E ⟶	190.84 (remaining balance after payment 25)

INTERNAL RATE OF RETURN
UP TO 12 CASH FLOWS





Description:

The interest rate that equates the present value of all future cash flows with the original investment is known as the internal rate of return (also called discounted rate of return or yield). Given the initial investment and up to 12 cash flows, this program calculates the periodic IRR. If more than 12 cash flows are entered, all cash flows over 12 will be ignored. There will be no indication, however, that more than 12 cash flows have been entered.

Zero should be entered for periods with no cash flow. This program cannot be used for problems with negative cash flows. All inputs must be positive values.

In many instances other programs may be more suitable for calculating IRR. If all cash flows are equal and equally spaced, program 3 is recommended. If all cash flows except the last are equal and equally spaced, program 5 is more suitable. If there are seven or less uneven cash flows program 22 is a better choice.

The user is asked to enter the largest cash flow in step 2 because of unique storage techniques being employed. This value is then used to scale all other cash flows, and depending on these values, accuracy may be reduced. Consequently, the resulting periodic rate of return should be considered accurate to within ±.01% (.0001 decimal). This largest cash flow must be entered again in sequence at step 3.

If a cash flow larger than the value entered for CF MAX is keyed in at step 3, erroneous results are likely.

The answer produced is the *periodic rate of return*. If the cash flow periods are other than annual (monthly, quarterly) the answer should be multiplied by the number of periods per year to determine the annual internal rate of return.

Unlabeled keys must not be pressed! If an unlabeled key is pressed by mistake, begin again at step 1 and reenter card 1.

(See Appendix E for comments on iterative solutions.)

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program on card 1				
2	Key in the largest cash flow	CF MAX	A		
3	Beginning with the first period,				
	key in all cash flows in				
	sequence, pressing B after each				
	value.	CF	B		
4	Key in the initial investment				
	amount	INV	C		
5	Enter program on card 2				
6	Calculate the periodic internal				
	rate of return		A		IRR (%)
7	For a new case go to step 1				

Example

Problem Statement:

Income property requiring a $250,000 equity investment and to be sold in ten years is expected to generate the "after-tax" cash flows shown below. What is the expected yield or IRR?

End of Year	Cash Flow	End of Year	Cash Flow
1	46,423	6	23,199
2	40,710	7	21,612
3	36,638	8	20,037
4	34,097	9	18,460
5	32,485	10	311,406 (CF MAX)

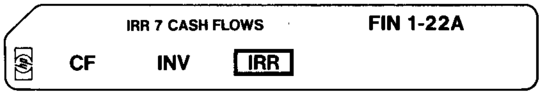
Keystrokes **See Displayed**

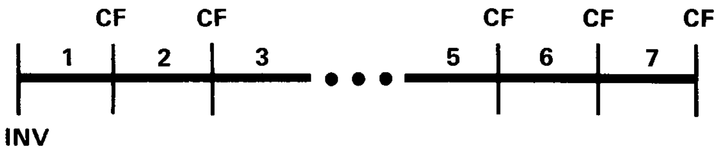
311406 **A** 46423 **B** 40710 **B** 36638 **B**
34097 **B** 32485 **B** 23199 **B** 21612 **B**
20037 **B** 18460 **B** 311406 **B** 250000 **C**

Card 2 is entered at this point

A ⟶ 13.98
(annual IRR is 13.98%)

INTERNAL RATE OF RETURN UP TO 7 CASH FLOWS





Description:

This program also calculates the periodic rate of return that will equate an initial investment to the present value of all future cash flows. By limiting the maximum number of cash flows to 7, this program is able to calculate answers more quickly and more accurately (±.001%) than program 21.

Zero should be keyed in for periods with no cash flow, and negative values (using [CHS]) should be entered for periods with cash outlays (See Appendix E for cautions applicable to negative values).

Errors will result if more than 7 cash flows are entered. Registers 1 thru 7 are used to store cash flows 1 thru 7 respectively. Therefore, should some doubt exist as to what has been entered the input data may be recalled ([RCL]) for review.

Unlabeled keys [D] and [E] should not be pressed. If pressed by mistake begin again at step 1 by reentering the magnetic card.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Beginning with the first period,				
	key in all cash flows in				
	sequence pressing A after				
	each value	CF	A		
3	Key in the initial investment	INV	B		
4	Calculate the periodic internal				
	rate of return		C		IRR (%)
5	For a new case go to step 2.				

Example

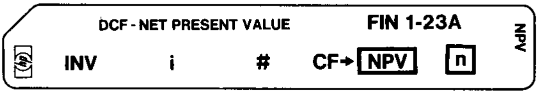
Problem Statement:

A shopping center requires a $200,000 investment, and will be sold at the end of 3 years. If this investment results in the semi-annual net cash flows shown below, what is the internal rate of return?

End of Six Month Period	Cash Flow
1	$ 0
2	9000
3	11000
4	11000
5	13000
6	212,000
	(includes net proceeds from sale)

Keystrokes	See Displayed
0 A 9000 A 11000 A 11000 A	
13000 A 212000 A 200000 B C →	4.53
	(a semi-annual IRR of 4.53%)
2 × →	9.06
	(an annual IRR of 9.06%)

DISCOUNTED CASH FLOW ANALYSIS
NET PRESENT VALUE



Description:

Assuming a minimum desired yield (cost of capital, discount rate), this program finds the present value of the future cash flows generated by the investment and subtracts the initial investment from this amount. If the final net present value is a positive value, the investment exceeds the profit objectives assumed. If the final net present value is a negative value, then the investment is not profitable to the extent of the desired yield. If the net present value is zero the investment meets the profit objectives.

The function associated with the [C] key (#) is designed to accommodate those situations where a series of the cash flows are equal. You enter the number of times these equal periodic cash flows occur with [C] (#) and then the amount only once with [D] (CF). If, however, a cash flow occurs only once there is no need to enter a 1 with [C].

Zero must be entered for all periods with no cash flow. When a cash flow other than the initial investment is an outlay (additional investment, loss etc.) the value must be entered as a negative number with [CHS].

Cash flows are assumed to occur at the end of cash flow periods.

This program can also be used to find the present value of a series of irregular cash flows that cannot be accommodated by programs 2 or 4 by simply entering zero as the initial investment.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Key in		[ ] [ ]	
	• initial investment amount	INV	[A] [ ]	
	• periodic interest (discount)		[ ] [ ]	
	rate	i (%)	[B] [ ]	
3	Key in the number of equal		[ ] [ ]	
	cash flows if greater than 1	#	[C] [ ]	
4	Key in cash flow amount(s) and		[ ] [ ]	
	calculate net present value	CF	[D] [ ]	NPV
5	Optional—display total number		[ ] [ ]	
	of cash flows entered so far		[E] [ ]	n
6	For next cash flow (s) go to		[ ] [ ]	
	step 3		[ ] [ ]	
7	For new case go to step 2		[ ] [ ]	

Example

Problem Statement:

Would an investment of $260,000 projected to generate the cash flows listed below be considered profitable if the desired annual yield is 9%?

End of Year	Cash Flow	End of Year	Cash Flow
1	-$1000	6	30000
2	0	7	30000
3	0	8	30000
4	23000	9	30000
5	28000	10	250000

Keystrokes	See Displayed
260000 [A] 9 [B] 1000 [CHS] [D] →	-260917.43 (NPV after 1st cash flow)
2 [C] 0 [D] →	-260917.43 (NPV after 3 cash flows)
[E] →	3.00 (checking that we've entered 3 period's cash flows so far)

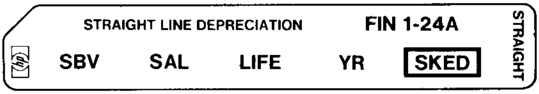
23000 **D** → −244623.65
(NPV after 4 cash flows)

28000 **D** → −226425.57
(NPV after 5 cash flows)

Keystrokes	See Displayed
4 **C** 30000 **D**	−163257.70 (NPV after 9 cash flows)
E	9.00 (9 period's cash flows entered so far)
250000 **D**	−57655.00 (NPV after 10 cash flows)

After the tenth and last cash flow the net present value is still negative and therefore the investment does not meet profit objectives.

STRAIGHT LINE DEPRECIATION SCHEDULE



Schedule – Straight-Line Method

Starting Book Value: $375,000 Salvage Value: $30,000
Estimated Useful Life: 40 Years

Year (End of)	Depreciation Amount (DEP)	Remaining Depreciable Value (RDV)	Remaining Book Value (RBV)	Depreciation To Date (Reserve)
1	8,625.00	336,375.00	366,375.00	8,625.00
2	8,625.00	327,750.00	357,750.00	17,250.00
15	8,625.00	215,625.00	245,625.00	129,375.00

Description:

The annual depreciation allowance using this method is determined by dividing the cost or other basis of valuation (starting book value) less its estimated salvage value by its useful life expectancy. This program develops the data shown in the schedule above, given the starting book value (SBV), salvage value (SAL), life expectancy (LIFE), and first year of the schedule (YR). (The schedule may be started at any point in the useful life.)

Fractional years lives must be entered as an integer plus a fraction. Thus a life of 12 years 3 months would be keyed in as 12.25 for LIFE.

Values for the last year of an asset with fractional years life (i.e., the 21st year's values for an asset with 20.5 years life) are calculated correctly. However, all other values represent a full year's depreciation. For this reason only integer values (whole numbers, 1.0, 2.0, 17.0 etc.) may be entered for YR (above the **D** key). The program makes no checks on this value and generates invalid results if other than whole numbers are entered.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Key in		[ ] [ ]	
	• starting book value		[ ] [ ]	
	(beginning basis)	SBV	[A] [ ]	
	• salvage value	SAL	[B] [ ]	
	• life of the asset in years	LIFE	[C] [ ]	
	• year for which depreciation		[ ] [ ]	
	is to be calculated	YR	[D] [ ]	
3	Calculate year's depreciation		[E] [ ]	DEP
4	Optional—calculate remaining		[ ] [ ]	
	depreciable value		[E] [ ]	RDV
5	Optional—calculate remaining		[ ] [ ]	
	book value		[E] [ ]	RBV
6	Optional—calculate total de-		[ ] [ ]	
	preciation to date (reserve)		[E] [ ]	RES
7	Optional—increment for the		[ ] [ ]	
	next year and go to step 3 for		[ ] [ ]	
	the next year's values		[E] [ ]	YR + 1
8	For new case go to step 2 and		[ ] [ ]	
	change appropriate inputs		[ ] [ ]	

Example

Problem Statement:

Produce the schedule shown on the previous page. That is, for a starting book value of $375,000, a salvage value of $30,000 and an expected life of 40 years, generate the schedule information for the first two years. Then jump ahead to the 15th year and generate the data for that year.

Keystrokes	See Displayed
375000 A 30000 B 40 C 1 D E ——→	8625.00 (1st year's depreciation)
E ——→	336375.00 (remaining depreciable value)
E ——→	366375.00 (remaining book value)

E ——————→ 8625.00
(total depreciation to date)

E ——————→ 2.00
(now entering 2nd year)

E ——————→ 8625.00
(2nd year's depreciation)

E ——————→ 327750.00
(remaining depreciable value)

E ——————→ 357750.00
(remaining book value)

E ——————→ 17250.00
(total depreciation after 2 years)

Now jump ahead to the 15th year

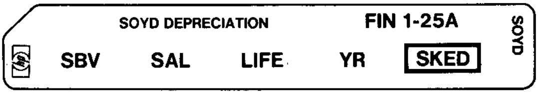
15 D E ——————→ 8625.00
(15th year's depreciation)

E ——————→ 215625.00
(remaining depreciable value)

E ——————→ 245625.00
(remaining book value)

E ——————→ 129375.00
(total depreciation after 15 years)

SUM OF THE YEARS' DIGITS DEPRECIATION SCHEDULE



Depreciation Schedule – Sum of the Years Digits Method

Starting Book Value: $375,000 Salvage Value: $30,000

Expected Useful Life: 40 Years

Year (End of)	Depreciation Amount (DEP)	Remaining Depreciable Value (RDV)	Remaining Book Value (RBV)	Depreciation To Date (Reserve)
1	16,829.27	328,170.73	358,170.73	16,829.27
2	16,408.54	311,762.20	341,762.20	33,237.80
15	10,939.02	136,737.80	166,737.80	208,262.20

Description:

The sum-of-the-years' digits method is an accelerated form of depreciation, allowing more depreciation in the early years of an asset's life than allowed under the straight line method. This program generates the data shown in the above schedule given the starting book value (SBV), the salvage value (SAL), expected useful life in years (LIFE), and beginning year (YR) for the schedule. (The schedule may be started at any point in the useful life.)

Fractional years asset life must be entered as an integer plus a fraction. Thus a life of 12 years 3 months would be keyed in as 12.25 for LIFE.

Values for the last year of an asset with fractional years life (i.e., the 21st year's values for an asset with 20.5 years life) are calculated correctly. However, all other values represent a full year's depreciation. For this reason only integer values (whole numbers, 1.0, 2.0 17.0, etc.) may be entered for YR (above the **D** key). The program makes no checks on this value and generates invalid results if other than whole numbers are entered.

Finally, unlike most programs in this pac, this program depends on values in the operational stack for successive depressions of the **E** (SKED) key. Thus, intermediate calculations between generating "sked" values are not permitted. Should this happen however, recovery is accomplished by simply keying in the appropriate value for YR (**D**) and generating the values again.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program		[ ]	[ ]	
2	Key in all of the following:		[ ]	[ ]	
	• starting book value (beginn-		[ ]	[ ]	
	ing basis)	SBV	[A]	[ ]	
	• salvage value	SAL	[B]	[ ]	
	• life of the asset in years	LIFE	[C]	[ ]	
	• year for which depreciation		[ ]	[ ]	
	is to be calculated	YR	[D]	[ ]	
3	Calculate year's depreciation		[E]	[ ]	DEP
4	Optional—calculate remaining		[ ]	[ ]	
	depreciable value		[E]	[ ]	RDV
5	Optional—calculate remaining		[ ]	[ ]	
	book value		[E]	[ ]	RBV
6	Optional—calculate total		[ ]	[ ]	
	depreciation to date (reserve)		[E]	[ ]	RES
7	Optional—increment for next		[ ]	[ ]	
	year and go to step 3 for the		[ ]	[ ]	
	next year's values		[E]	[ ]	YR + 1
8	For new case go to step 2 and		[ ]	[ ]	
	change appropriate inputs.		[ ]	[ ]	

Example

Problem Statement:

Generate values for the first and fifteenth year for a $375,000 asset that has a salvage value of $30,000 and an expected life of 40 years. (This schedule is shown on the previous page.)

Keystrokes	See Displayed
375000 [A] 30000 [B] 40 [C] 1 [D] [E] ⟶	16829.27 (1st years depreciation)
[E] ⟶	328170.73 (remaining depreciable value)
[E] ⟶	358170.73 (remaining book value)
[E] ⟶	16829.27 (total depreciation to date)

E ——————→ 2.00
(now entering 2nd year)

We could continue pressing **E** to generate the 2nd and subsequent years' values. However, we'll jump ahead to the 15th year.

15 **D** **E** ——————→ 10939.02
(15th year's depreciation)

E ——————→ 136737.80
(remaining depreciable value)

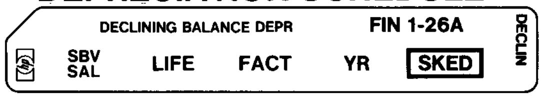
E ——————→ 166737.80
(remaining book value)

E ——————→ 208262.20
(total depreciation 1st through 15th year)

E ——————→ 16.00
(now entering 16th year)

Etc.

VARIABLE RATE DECLINING BALANCE DEPRECIATION SCHEDULE



Depreciation Schedule – Declining Balance Method
Starting Book Value: $375,000 Salvage Value: $30,000
Expected Useful Life: 40 Years Rate: 1.5

Year (End of)	Depreciation Amount (DEP)	Remaining Depreciable Value (RDV)	Remaining Book Value (RBV)	Depreciation To Date (Reserve)
1	14,062.50	330,937.50	360,937.50	14,062.50
2	13,535.16	317,402.34	347,402.34	22,597.66
15	8,235.18	181,369.51	211,369.51	163,630.49

Description:

The variable rate declining balance method is another form of accelerated depreciation; as such it provides for more depreciation in earlier years and decreasing depreciation in later years. This program generates the data shown in the above schedule given the starting book value (SBV), salvage value (SAL), useful life expectancy (LIFE), the declining rate factor (FACT), and the first year of the desired schedule (YR). The schedule may be started at any point in the useful life.

The "variable rate" is indicated as either a factor or percent with equal frequency in the business community. Thus, "1.5 declining balance factor" and "150% declining balance" have the same meaning. The number to be keyed in for FACT (**C**) in this program, should be in factor form, that is 1.25, 1.5, 2, and not 125, 150 or 200.

This method of depreciation is unique in that it may generate depreciation greater than the depreciable value for some assets, while it may not generate sufficient depreciation for others.

This program will not allow an asset to be depreciated below its salvage value. That is when the generated depreciation for a year, usually the last, is greater than the remaining depreciable value, the latter is displayed as the depreciation amount. Program 27 is provided to assist in determining the best time to switch to straight line depreciation (tax laws permitting) so that an asset may be fully depreciated.

Fractional years lives must be entered as an integer plus a fraction however. Thus, a life of 12 years 3 months would be keyed in as 12.25.

Values for the last year of an asset with fractional years life (i.e., the 21st year's values of an asset with 20.5 years life) are calculated correctly. However, all other values represent a full year's depreciation. For this reason only integer values (whole numbers 1.0, 2.0, 17.0, etc.) may be entered for YR (above the D key). The program makes no checks on this value and will generate invalid results if other than whole numbers are entered.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in starting book value				
	(beginning basis)	SBV	A		
3	Key in salvage value	SAL	A		
4	Key in all the following:				
	• life of the asset	LIFE	B		
	• declining rate factor				
	(1 < FACT ⩽ 2)	FACT	C		
	• year for which depreciation				
	is to be calculated	YR	D		
5	Calculate year's depreciation		E		DEP
6	Optional—calculate remaining				
	depreciable value		E		RDV
7	Optional—calculate remaining				
	book value		E		RBV
8	Optional—calculate total				
	depreciation to date (reserve)		E		RES
9	Optional—increment for next				
	year's depreciation and go to				
	step 5		E		YR + 1
10	New case: If either SBV or				
	SAL require changing, both				
	must be input at steps 3 and 4.				
	Values keyed in at step 4 are				
	retained and only changed				
	values need be keyed in.				

Example

Problem Statement:

Generate the values for the 1st and 15th year in the schedule shown on the previous page. Also calculate the remaining depreciable value in the 40th (last) year.

Keystrokes	See Displayed
375000 A 30000 A 40 B 1.5 C 1 D E ⟶	14062.50 (1st year's depreciation)
E ⟶	330937.50 (remaining depreciable value)
E ⟶	360937.50 (remaining book value)
E ⟶	14062.50 (total depreciation to date)
E ⟶	2.00 (now entering 2nd year)

We could continue calculating the second year's values but we'll jump ahead to the 15th year.

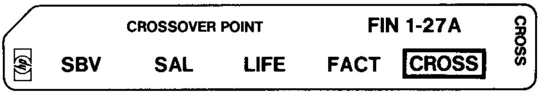
15 D E ⟶	8235.18 (15th year's depreciation)
E ⟶	181369.51 (remaining depreciable value)
E ⟶	211369.51 (remaining book value)
E ⟶	163630.49 (total depreciation 1st through 15th year)

Jumping ahead to the 40th year.

40 D E ⟶	3167.32 (40th year's depreciation)
E ⟶	51294.43 (remaining depreciable value)

Note that in the last year of the asset's life there would still be a total of $51,294.43 of remaining depreciable value on the books if this schedule were used throughout the asset's life. (See program 27)

CROSSOVER POINT-DECLINING BALANCE TO STRAIGHT LINE



Description:

As indicated in the description and example for program 26, the declining balance method of depreciation may not fully depreciate an asset in the asset's lifetime. In these circumstances there is an optimum point in the useful life where a switch from the declining balance method to the straight line method should be made. This is the "crossover point", the first year in which the depreciation by the straight line method is greater than if depreciation were continued using declining balance method. (In accordance with Internal Revenue Service publication 534, the straight line depreciation is determined by dividing the remaining depreciable value by the remaining useful life.)

Given the starting book value (SBV), salvage value (SAL), useful life expectancy (LIFE), and declining balance factor (FACT), this program calculates the last year that the declining balance method should be used, and the remaining life and remaining book value after this "last year" so that a switch to straight line depreciation can be made. Should there be no optimum crossover point, this condition will be indicated by blinking zeroes. This implies that the declining balance method is "best" for the entire depreciable life.

Thus, this program (27), the declining balance depreciation program (26), and the straight line depreciation program (24) may be used as follows:

A. This program is used to determine the "crossover point" and associated values.

B. Program 26 is entered and a declining balance depreciation schedule is generated for the early years up to and including the year indicated as being the "last year"

   Note that since the depreciation programs use the same storage register conventions, only a value for YR (**D**) need be keyed in for program 26.

C. Finally, program 24 is entered. The remaining book value at the end of the last "declining balance year" is keyed in for starting book value (SBV–**A**), and the remaining life is keyed in for the asset's life (LIFE–**C**). There is no need to enter the salvage value as it has been retained throughout this process. A straight line depreciation schedule may now be generated for the remaining years.

Note that for this portion of the depreciation schedule the value for "total depreciation to date" (reserve) will be in error by an amount equal to the amount depreciated during the declining balance calculations.

As in program 26, the declining balance factor (FACT) should be entered in factor form (1.25, 1.5, 2.0), not as a percent (125, 150, 200).

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in all of the following:				
	• starting book value				
	(beginning basis)	SBV	A		
	• salvage value	SAL	B		
	• life of the asset	LIFE	C		
	• declining rate factor				
	(1 < FACT ⩽ 2)	FACT	D		
3	Calculate last year to use declin-				
	ing balance method		E		Last Year
4	Calculate remaining life		E		Rem Life
5	Calculate remaining book value		E		RBV
6	For new case go to step 2 and				
	change appropriate values				

Problem Statement:

An asset has a starting book value of $375,000, a 40 year life expectancy, and a projected salvage value of $30,000. Using a 1.5 declining balance factor:

1. Determine the crossover point and the associated remaining life and remaining book value with program 27.

2. Generate the depreciation data for the declining balance "last year" with program 26. (Normally the user would generate a full schedule beginning with the 1st year).

3. Switching to the straight line method (program 24), generate the depreciation data for the year following the declining balance "last year".

Keystrokes	**See Displayed**
Enter program 27.	
375000 A 30000 B 40 C 1.5 D E ⟶	18.00 (last year to use declining balance)
E ⟶	22.00 (asset's remaining life after 18 years)
E ⟶	188471.01 (remaining book value after 18th year)
Now enter program 26.	
18 D E ⟶	7343.03 (18th year's depreciation)
E ⟶	158471.01 (remaining depreciable value)
E ⟶	188471.01 (remaining book value; note correspondence with program 27 above)
E ⟶	186528.99 (total depreciation for 1st through 18th year)
Now enter program 24.	
188471.01 A 22 C 1 D E ⟶	7203.23 (19th year's depreciation)

NOTE: That while 1 was keyed in for YR—the first year of straight line depreciation—this is the 19th year of the asset's life.

E ————————→ 151267.78
(remaining depreciable value)

E ————————→ 181267.78
(remaining book value)

etc.

DAYS BETWEEN DATES (ACTUAL)

Description:

This program calculates the actual number of days between any two dates that occur between January 1, 1901 and December 31, 2099. The earlier date is keyed in for DT1 (**A**), the later date is keyed in for DT2 (**B**) and the calculation is performed by pressing **C** (DAYS).

Both dates are retained so that only a changed date must be keyed in for a new calculation.

The date format for input is MM.DDYYYY (October 2, 1970 is keyed in as 10.021970). The program does not check input data, however. Thus, if an improper format is used, or a date outside of the 1901 to 2099 limits is entered, or an invalid date (i.e., February 30) is keyed in, erroneous answers will result.

An important feature of this program is that it is designed to be used in conjunction with the Bond Price and Bond Yield programs (30, 31, and 32). When the settlement date is entered for DT1 and the redemption date (maturity date, call date, etc.) is entered for DT2, pressing **C** also causes the number of remaining semiannual coupon periods to be stored for use by these bond programs. The number of semiannual coupon periods is determined by subtracting the number of leap days (February 29 of a leap year) from the actual number of days (the displayed value) and dividing this by 182.5 (days per semiannual period).

In addition, the settlement date is retained throughout the bond calculations. Therefore on return to this program, it is only necessary to key in a new DT1 if the settlement date is different.

Unlabeled keys **D** and **E** are not protected as described in Appendix B and should not be pressed. If pressed by mistake, DT1 and DT2 must be keyed in again prior to performing the DAYS calculation.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Key in the following:		[ ] [ ]	
	• earliest date (DT 1)	MM.DDYYYY	[A] [ ]	
	• latest date (DT 2)	MM.DDYYYY	[B] [ ]	
3	Calculate the number of days		[ ] [ ]	
	between the two dates		[C] [ ]	DAYS
4	For new case go to step 2 and		[ ] [ ]	
	change DT 1 and/or DT 2 as		[ ] [ ]	
	appropriate.		[ ] [ ]	

Example

Problem Statement:

Calculate the number of days between February 1, 1965 and November 7, 1989.

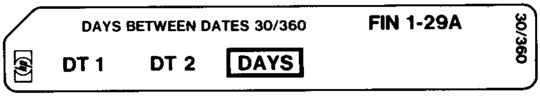
Keystrokes	See Displayed
2.011965 [A] 11.071989 [B] [C] ——→	9045.00

Problem Statement:

Having just performed the above calculation, now calculate the number of days between February 1, 1965 and March 15, 1991.

Keystrokes	See Displayed
3.151991 [B] [C] ——→	9538.00

DAYS BETWEEN DATES (30/360 BASIS)



Description:

This program calculates the number of days between any two dates on a 30/360 basis (30 day month, 360 day year), as is the custom for many securities. The earliest date is keyed in for DT1 (**A**), the latest date is keyed in for DT2 (**B**), and the calculation is performed by pressing **C** (DAYS).

Both dates are retained so that only a changed date must be keyed in for a new calculation.

The date format for input is MM.DDYYYY (October 2, 1970 is keyed in as 10.021970). The program does not check input data however. Thus if an improper date format is used, or an invalid date is keyed in (e.g., February 30), erroneous answers will result.

An important feature of this program is that it is designed to be used in conjunction with the Bond Price and Bond Yield programs (30, 31, and 32). When the settlement date is entered for DT1 and the redemption date (maturity date, call date, etc.) is entered for DT2, pressing **C** also causes the number of semiannual coupon periods to be stored for use by these bond programs. The number of semiannual coupon periods is determined by dividing the number of days (displayed value) by 180 (days per semiannual period). In addition, the settlement date is retained throughout the bond calculations. Therefore, on return to this program, it is only necessary to key in a new DT1 if the settlement date is different.

Unlabeled keys **D** and **E** are not protected as described in Appendix B and should not be pressed. If pressed by mistake, DT1 and DT2 must be keyed in again prior to performing the DAYS calculation.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in the following:				
	• Earliest date (DT 1)	MM.DDYYYY	A		
	• Latest date (DT 2)	MM.DDYYYY	B		
3	Calculate the days between the				
	two dates		C		DAYS
4	For a new case go to step 2 and				
	change DT 1 and/or DT 2 as				
	appropriate				

Examples

Problem Statement:

Calculate the number of days between February 1, 1965 and November 7, 1989.

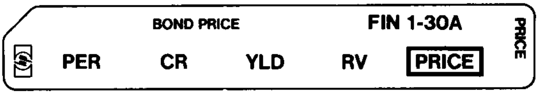
Keystrokes	See Displayed
2.011965 [A] 11.071989 [B] [C] ⟶	8916.00

Problem Statement:

Having just performed the above calculation, now calculate the number of days between February 1, 1965 and March 15, 1991.

Keystrokes	See Displayed
3.151991 [B] [C] ⟶	9404.00

BOND PRICE



Description:

This program calculates the "flat" price (i.e., not including accrued interest) of a semiannual coupon bond. Data required for input are the number of coupon periods (PER, A) between settlement date and redemption date (maturity date, call date, etc.), the annual coupon rate expressed as a percent (CR, B), the annual yield expressed as a percent (YLD, C), and the redemption value (RV, D) if other than 100.

All prices are expressed as a percent of the face value. (e.g., since most bonds have a face value of $1,000, a call price of 107 implies an actual redemption value of $1,070 if the bond is "called".)

The amount of the accrued interest for the expired portion of the current coupon period is available in register 5 and may be recalled (RCL 5).

Each time the coupon rate is entered by pressing B, the redemption value is automatically set to 100. This is the proper value for a price-to-maturity calculation, and no value must be keyed in for redemption value (RV). If however, the price-to-call is desired and the call price is other than 100, the call price has to be entered for RV *after* the coupon rate has been keyed in.

All input data are retained so that, when alternative calculations are to be performed, only changed data must be keyed in. This permits, for instance, calculating the price for each of several different yields. In addition, if either of the calendar programs are used for calculating the number of remaining coupon periods, the settlement date is retained throughout the bond calculations and need not be reentered when returning to programs 28 or 29 for another bond calendar calculation.

The number of remaining coupon periods between settlement date and redemption date can be calculated and entered in two ways. If one of the calendar programs (28 or 29) is used to calculate the number of days between settlement date and redemption date, the number of remaining semiannual coupon periods is automatically calculated and stored in register 1 for use by the bond programs. In this case the instruction to enter the number of remaining coupon periods in step 3 below may be ignored. If however, the number of remaining coupon periods is already known, or the method used to calculate this value by the calendar programs is deemed inappropriate, it can be entered in step 3. Choosing between an actual or 30/360 calendar calculation depends on trade custom for the particular security. Corporate bonds are traditionally traded on a 30/360 basis, while many government securities use an "actual" calendar.

While the bond programs are optimized for semiannual coupon bonds, they may be used for bonds with more or less frequent coupon periods. The procedure is to adjust the number of remaining coupon periods, the coupon rate, and the yield rate prior to calculating the price (a sample problem is included in the examples).

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Optional—use program 28 or 29				
	to calculate the number of				
	remaining coupon periods.				
2	Enter the Bond Price program				
3	Key in				
	• number of remaining coupon				
	periods (may be omitted if				
	step 1 is performed)	PER	A		
	• annual coupon rate	CR (%)	B		
	• annual yield rate	YLD (%)	C		
4	Key in the redemption value				
	if other than 100	RV	D		
5	Calculate the "flat" price		E		PRICE
6	Optional—recall the accrued				
	interest		RCL	5	ACC INT
	and				
	add it to the "flat" price to				
	obtain total bond value as of				
	the settlement date		+		Bond Value
7	For a new case go to step 1 or				
	3 and change appropriate values.				
	NOTE: When CR is entered				
	RV is automatically set to 100.				

Examples

Problem Statement:

What is the price of a semiannual 3% bond to yield 10% if purchased on January 1, 1972. The bond matures March 6, 1978. (Use the 30/360 calendar–program 29.)

Keystrokes	See Displayed
Enter program 29	
1.011972 A 3.061978 B C ⟶	2225.00
	(days settlement to maturity, 30/360 basis)
Now enter program 30	
3 B 10 C E ⟶	68.29
	(price-to-maturity)

Problem Statement:

Having performed the above calculation, determine the price of the same bond using the "actual calendar", program 28. Remember, the settlement date has been retained and need not be reentered.

Keystrokes	See Displayed
Enter program 28	
3.061978 B C ⟶	2256.00
	(actual days settlement to maturity)
Enter program 30	
3 B 10 C E ⟶	68.31
	(price-to-maturity)

Problem Statement:

The bond described above is callable on March 6, 1975 at a call price of 102. What is the price-to-call if the actual calendar is used? (If these problems are solved in the sequence shown the settlement date is still available).

Keystrokes	See Displayed
Enter program 28	
3.061975 B C ⟶	1160.00
	(actual days, settlement to call)

Now enter program 30

3 **B** 10 **C** 102 **D** **E** ——————→ 82.81
(price-to-call)

Problem Statement

An *annual* coupon bond with a 5% coupon is settled on March 1, 1974. If the yield is 5.5%, and the bond matures on February 1, 1984 what is the price-to-maturity? (Use the 30/360 calendar, program 29.)

Keystrokes **See Displayed**

Enter program 29

3.011974 **A** 2.011984 **B** **C** ——————→ 3570.00
(days settlement to maturity, 30/360 basis)

Determine the number of *annual coupon periods* remaining by dividing by the number of days in a coupon period.

360 [÷] ——————→ 9.92
(number of annual coupon periods)

Enter the Bond Price program 9.92
(entering a program does not affect the display or other registers)

A ——————→ 9.92
(the correct value for PER is entered)

The coupon rate and yield rate must be multiplied by a factor prior to input. This factor is determined by dividing the number of coupon periods per year into 2. For annual coupon bonds the factor is therefore 2 (for quarterly coupons the factor is 0.5, etc.)

5 [ENTER↑] 2 [×] **B** 5.5 [ENTER↑]
2 [×] **C** **E** ——————→ 96.24
(price-to-maturity)

BOND YIELD
(1 OR MORE REMAINING COUPON PERIODS)

Description:

This program calculates the annual yield of a semiannual coupon bond *when there are one or more remaining coupon periods* between settlement and redemption dates. Data required for input are the number of coupon periods (PER, **A**) between settlement date and redemption date (maturity date, call date, etc.), the annual coupon rate expressed as a percent (CR, **B**), the bond price (PRICE, **C**), and the redemption value (RV, **D**) if other than 100.

All comments concerning data entry, data definitions, and calendar calculations mentioned in the description of the Bond Price program apply to this program.

If the value entered for the number of remaining coupon periods is less than 1, blinking zeroes will appear in the display after pressing **E**. To review the value entered in step 3 below or stored by the calendar programs (28 or 29) simply press [RCL] 1 [CHS] (for programming reasons the number of coupon periods is stored as a negative number). Program 32 is intended for yield calculations when there is a fraction of a coupon period remaining between the settlement and redemption dates.

This program and program 32 may be used for after tax as well as before tax yield calculations. The procedure is to reduce the coupon and redemption values to their after tax net values prior to entering them in the program. (A sample problem is shown in the examples.) This can be important when comparing a bond with taxable coupons to one whose coupons are tax free.

The programs may also be used to calculate a yield when a bond is purchased, and then sold prior to redemption by the issuer. The procedure is simply to treat the exit date and price as the redemption date and redemption value respectively. The yield calculated is the precise yield if the exit date is also a coupon date, and is an approximate yield for other exit dates.

Finally, this program may be used for bonds with other than semiannual coupon periods. The number of remaining coupon periods, and the coupon rate must be adjusted as indicated in the description and examples of the Bond Price program. The yield is calculated by pressing **E** and then dividing the result by the same factor used to adjust the coupon rate.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Optional—use program 28 or				
	29 to calculate the number of				
	remaining coupon periods				
2	Enter this program				
3	Key in				
	• number of remaining coupon				
	periods (may be omitted if				
	step 1 is performed)	PER	A		
	• annual coupon rate	CR (%)	B		
	• bond price	PRICE	C		
4	Key in redemption value if				
	other than 100.	RV	D		
5	Calculate the annual yield		E		YLD (%)
6	For a new case go to step 1 or				
	3 and change appropriate values.				
	Note: when CR is entered RV				
	is automatically set to 100.				

Examples

Problem Statement:

A semiannual coupon bond with a 5% coupon rate maturing February 6, 1993, was purchased November 15, 1973 for a price of 99. The bond is callable on February 6, 1980 at a call price of 101. What is the yield-to-call and yield-to-maturity if the 30/360 calendar is used?

Keystrokes	See Displayed
Enter program 29	
11.151973 A 2.061980 B C ——→	2241.00 (days settlement to call)
Enter program 31	
5 B 101 D 99 C E ——→	5.33 (yield-to-call)
Enter program 29	
2.061993 B C	6921.00 (days settlement to maturity)

Enter program 31

5 [B] 99 [C] [E] ——→ 5.08
(yield-to-maturity)

Problem Statement:

Having just completed the before tax yield-to-maturity calculation in the previous example, the bond purchaser wishes to perform an after tax yield-to-maturity calculation. He is in a 40% income tax bracket and a 25% tax is to be applied to capital gains.

Keystrokes	**See Displayed**
First, calculate and enter the after tax value of the coupon.	
5 [ENTER↑] [ENTER↑] .4 [×] [−] [B]	3.00 (net after tax coupon)
Now calculate and enter the net after tax proceeds when the bond is redeemed for 100 at maturity.	
100 [ENTER↑] [ENTER↑] 99 [−]	1.00 (capital gain)
.25 [×]	0.25 (capital gains tax)
[−] [D]	99.75 (net proceeds from bond redemption)
(The price and remaining coupon periods have been retained from the previous calculation.)	
[E]	3.06 (after tax yield)

BOND YIELD
(LESS THAN 1 REMAINING COUPON PERIOD)

Description:

This program calculates the annual yield of a semiannual coupon bond *when there is less than one coupon period remaining* between settlement and redemption dates. Data required for input are the fraction of a coupon period remaining (PER, **A**), the annual coupon rate expressed as a percent (CR, **B**), the bond price (PRICE, **C**), and the redemption value (RV, **D**) if other than 100.

All comments in the description of programs 30 (Bond Price) and 31 (Bond Yield) concerning data entry, data definitions and calendar calculations apply to this program.

If the value entered for the number of remaining coupon periods is equal to or greater than one, blinking zeroes will appear in the display after pressing **E** . To review the value entered in step 3 below or stored by the calendar programs (28 or 29) simply press RCL 1 CHS (for programming reasons the number of coupon periods is stored as a negative number).

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Optional—use program 28 or				
	29 to calculate the number of				
	remaining coupon periods				
2	Enter this program				
3	Key in				
	• number of remaining coupon				
	periods (may be omitted if				
	step 1 is performed)	PER	A		
	• annual coupon rate	CR (%)	B		
	• bond price	PRICE	C		
4	Key in redemption value if other				
	than 100.	RV	D		YLD (%)
5	Calculate the annual yield		E		
6	For a new case go to step 1 or 3				
	and change appropriate values.				
	NOTE: When CR is entered				
	RV is automatically set to 100				

Examples

Problem Statement:

A U.S. Treasury Note with a 5.75% coupon and 88 days from settlement to maturity is purchased at 100 18/32. If there are assumed to be 183 days in a coupon period, what is the yield-to-maturity?

Keystrokes	See Displayed
5.75 [B] 88 [ENTER↑] 183 [÷] [A] ⟶	0.48 (fraction of a coupon period remaining)
18 [ENTER↑] 32 [÷] 100 [+] [C] [E] ⟶	3.34 (annual yield-to-maturity)

Problem Statement:

Assuming that the previous problem has just been performed as shown, calculate the yield if there are assumed to be 182 days in a coupon period instead of 183.

Keystrokes	See Displayed
88 [ENTER↑] 182 [÷] [A] [E] ⟶	3.35 (annual yield-to-maturity)

ACCRUED SIMPLE INTEREST

Description:

This program calculates the accrued simple interest given the number of days, annual interest rate, and the initial principal. Answers based on a 360 or 365 day year are made available. In addition, the user may choose to add the calculated accrued interest to the initial principal to determine the final amount.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Key in			
	• number of days	DAYS	A	
	• annual interest rate	RATE (%)	B	
	• beginning amount	BEG AMT	C	
3	Calculate either or both:			
	• accrued interest (360 day			
	year)		D	INT 360
	and final amount (optional)		+	FIN AMT
	and/or			
	• accrued interest (365 day			
	year)		E	INT 365
	and final amount (optional)		+	FIN AMT
4	For a new case go to step 2 and			
	change the appropriate values			

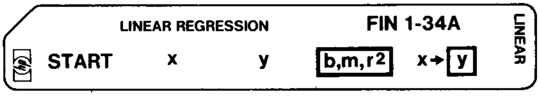
Example

Problem Statement:

Calculate the accrued interest and final amount (both 360 and 365 day basis) for a $30,000, 8%, 90 day interest at maturity note.

Keystrokes	See Displayed
30000 C 8 B 90 A D →	600.00 (Interest, 360 day basis)
+ →	30600.00 (Final amount, 360 day basis)
E →	591.78 (Interest, 365 day basis)
+ →	30591.78 (Final amount, 365 day basis)

LINEAR REGRESSION (TREND LINE)



Description:

This program performs a least squares linear regression given a series of x, y data pairs as input. Linear regression is a statistical method for finding a straight line that best fits a set of data points. The equation of this straight line expresses the linear relationship between an independent (x) and dependent (y) variable and is of the form:

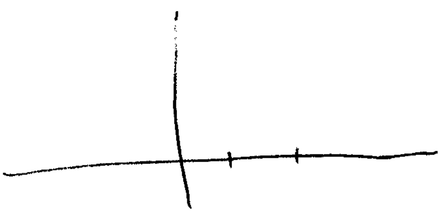
$$y = m x + b$$

where:

- y = dependent variable
- m = slope of the straight line
- x = independent variable
- b = the value of y when x = 0, called the "y-intercept."

In addition to calculating values for the slope and y-intercept this program also provides the coefficient of determination r^2. This is an indication of the "goodness of fit" for the calculated straight line, and is a number between 0 and 1. Values closer to 1 indicate "better" fits than values closer to 0.

Having determined the equation (first depression of the **D** key), the user can then project estimates of y values for given x values.



STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Initialize (START)		A	
3	Key in x value	x	B	
	and corresponding y value	y	C	
4	Repeat step 3 for all x, y data			
	pairs			
5	Display y-intercept (i.e., y for			
	x = 0)		D	b
6	Optional—display slope of			
	linear regression line		D	m
7	Optional—compute coefficient			
	of determination		D	r^2
8	Optional—key in an x value and			
	calculate the linear projection			
	of the y value	x	E	y
	(This step may be repeated as			
	often as desired.)			
9	For additional data, same			
	problem, go to step 3 and key			
	in additional x, y data pairs			
10	For new case go to step 2.			

Examples

Problem Statement:

A commercial land appraiser has examined 3 vacant lots in the downtown section of a local community, all of which have the same depths but different frontages and values as shown below. Based on this data, what is the relationship between frontage and lot value? What predicted value would a lot have with a 65 foot frontage? With a 50 foot frontage?

Lot Frontage (feet)	Lot Value
70.8	$10,100.00
60.0	$ 8,219.00
85.0	$15,000.00

Keystrokes	See Displayed
A 70.8 **B** 10100 **C** 60 **B** 8219 **C**	
85 **B** 15000 **C** **D** ——→	–8676.69 (y-intercept, b)
D ——→	275.02 (slope, m)
D ——→	.97 (coefficient of determination)
65 **E** ——→	9199.54 (value for 65 foot frontage)
50 **E** ——→	5074.25 (value for 50 foot frontage)

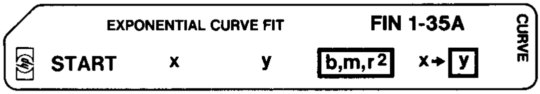
Problem Statement:

Assume that the above problem has just been performed as shown and additional data (listed below) has become available. Key in this data and recalculate the projections.

Lot Frontage (feet)	Lot Value
75.2	$11,120
67.0	9,500

Keystrokes	See Displayed
75.2 **B** 11120 **C** 67 **B** 9500 **C** **D**	
65 **E** ——→	9011.21 (value for 65 foot frontage)
50 **E** ——→	4973.51 (value for 50 foot frontage)

EXPONENTIAL CURVE FIT (GROWTH CURVE)



Description:

Given a series of x, y data pairs as input this program performs a least squares regression to determine the best exponential curve fit of the form:

$$y = be^{mx}$$

where:

- y = dependent variable
- b = the value of y when x = 0, called the "y-intercept"
- e = a constant (2.718281828)
- m = the slope or rate of growth of the curve
- x = independent variable

This technique is often used to determine the growth rate of a variable such as a stock's value over time, when it is suspected that the performance is non-linear, (If a linear relationship is suspected, program 34 should be used). The value for m is the decimal value of the continuous growth rate. For instance, assume after keying in several end-of-month price quotes for a particular stock, it is determined that the value for m is .10. This means that over the measured period the stock has experienced a 10% continuous growth rate.

In addition to calculating values for the best exponential curve fit equation, this program also calculates the coefficient of determination, r^2. This is an indication of the "goodness of fit" and is a number between 0 and 1. Values closer to 1 indicate a "better" fit than values closer to 0.

Having determined the exponential curve fit equation (after first depression of **D**), the user can then key in x values and generate projected y values, by pressing **E**.

y values input at step 3 below must be positive numbers.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Initialize (START)		[A] [ ]	
3	Key in x value	x	[B] [ ]	
	and corresponding y value	y	[C] [ ]	
4	Repeat step 3 for all x, y data		[ ] [ ]	
	pairs		[ ] [ ]	
5	Display y-intercept (i.e., y for		[ ] [ ]	
	x = 0)		[D] [ ]	b
6	Optional–display slope of the		[ ] [ ]	
	exponential curve		[D] [ ]	m
7	Optional–compute coefficient		[ ] [ ]	
	of determination		[D] [ ]	r^2
8	Optional–key in an x value and		[ ] [ ]	
	calculate a corresponding y		[ ] [ ]	
	value. (This step may be		[ ] [ ]	
	repeated as often as desired)	x	[E] [ ]	y
9	For additional data, same		[ ] [ ]	
	problem, go to step 3 and key		[ ] [ ]	
	in additional x, y data pairs		[ ] [ ]	
10	For a new case go to step 2		[ ] [ ]	

Example

Problem Statement:

A stock's price history is listed below. What continuous growth rate does this represent? If the stock continues this growth rate, what is the price projected to be at the end of 1974 (year 5)?

End of Year	Price
1970 (1)	52½
1971 (2)	55¼
1972 (3)	(missing data)
1973 (4)	61

Keystrokes **See Displayed**

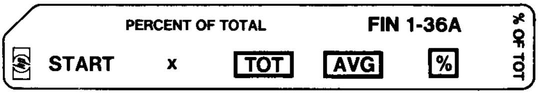
[A] 1 [B] 52.5 [C] 2 [B] 55.25 [C] 4 [B] 61 [C] [D] ——► 49.96 (y-intercept, b)

[D] ——► 0.05 (5% growth rate)

[D] ——► 1.00 (coefficient of determination, r^2)

5 [E] ——► 64.14 (projected price at the end of 1974)

TOTAL, AVERAGE, AND PERCENT OF TOTAL (UP TO 8 ITEMS)



Description:

This program computes a total for up to 8 items, calculates each item's percent of the total and determines the average value of all items entered. After pressing **B** in step 3 below, the display will show the number of items entered up to that point. If more than 8 items are entered, errors will occur when calculating answers.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Initialize (START)		A		0.00
3	Key in a value	x	B		#
4	Go to step 3 until all values				
	have been keyed in. (8 values				
	maximum)				
5	Optional—compute total		C		TOT
6	Optional—compute average				
	(i.e., arithmetic mean)		D		AVG
7	Optional—compute each value's				
	percent of total in the same				
	order as they were input		E		%
8	Optional—review the value				
	whose percent of total has been				
	calculated in step 7		g	x⇄y	x
9	Go to step 7 for each value's				
	percent of total				
10	For new case go to step 2				

Example

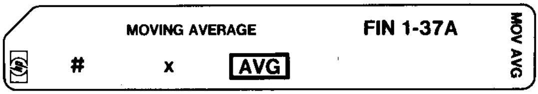
Problem Statement:

Five groups of a department have submitted the budgets shown below. Determine the department's total budget, each group's percent of the total, and the average budget size.

Group	Budget
1	$30,168
2	75,550
3	52,600
4	27,800
5	41,750

Keystrokes	See Displayed
A 30168 **B** ⟶	1.00
75550 **B** ⟶	2.00
52600 **B** ⟶	3.00
27800 **B** ⟶	4.00
41750 **B** ⟶	5.00
C ⟶	227868.00 (Total budget)
D ⟶	45573.60 (Average group budget)
E ⟶	13.24 (1st group's % of total)
E ⟶	33.16 (2nd group's % of total)
E ⟶	23.08 (3rd group's % of total)
E ⟶	12.20 (4th group's % of total)
E ⟶	18.32 (5th group's % of total)
[g] [x⇄y] ⟶	41750.00 (5th group's budget)

MOVING AVERAGES



Description:

This program calculates a 2 to 6 unit moving average. The user is asked to first indicate how many units are to be carried in the moving average (#, A). Next, values are keyed in (x, B) until the number of values keyed in equals the number of units indicated. The first average is then calculated (C). After this, program operation consists of alternately keying in a value (B) and computing the moving average (C). Each time a new value is entered, the appropriate earlier value is automatically deleted. (e.g., when a 3 unit moving average is being maintained, entering the fourth value causes the first value to be subtracted and the fourth to be added to a running total, and so on for subsequent values.) Also, each time a value is entered by pressing B , the display shows how many values have been entered thus far.

If a value other than 2, 3, 4, 5 or 6 is entered for the number of units (#, A) the calculator will blink zeroes when an attempt is made to calculate the moving average.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program			
2	Input the number of units in			
	the moving average	#	A	
3	Input the first # values	x	B	
4	Compute the average of the last			
	# values		C	AVG
5	Input the next value of x and			
	go to step 4.	x	B	
	If no more values exist go to			
	step 6.			
6	For new case go to step 2.			

Example

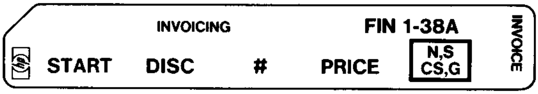
Problem Statement:

The number of widgets produced by a manufacturing line for the last ten successive work days is shown below. The line supervisor would like to compute a 5 workday moving average for his line crew's production over this period.

DAY	WIDGETS	DAY	WIDGETS
1	21,157	6	27,112
2	32,670	7	21,017
3	11,255	8	19,159
4	13,176	9	31,900
5	30,050	10	31,672

Keystrokes	See Displayed
5 [A] 21157 [B] 32670 [B]	
11255 [B] →	3.00 (3 entries so far)
13176 [B] 30050 [B] [C] →	21661.60 (Average, days 1–5)
27112 [B] [C] →	22852.60 (Average, days 2–6)
21017 [B] [C] →	20522.00 (Average, days 3–7)
19159 [B] [C] →	22102.80 (Average, days 4–8)
31900 [B] [C] →	25847.60 (Average, days 5–9)
31672 [B] [C] →	26172.00 (Average, days 6–10)

INVOICING



Description:

Given a discount rate (DISC), number of units (#), and price per unit (PRICE) for each line item, this program calculates the net line total (N), and maintains a running subtotal (S) and grand total (G).

The net line total is the number of units multiplied by the unit price, less the discount amount. Each time it is calculated (first depression of the **E** key), the value is added to both the running subtotal and the grand total. A second depression of the **E** key displays the running subtotal. A third depression clears the running subtotal accumulation (grand total is not affected). A fourth depression displays the grand total (without clearing it). The grand total is not cleared (set to zero) until you START (**A** key) a new problem.

The discount rate, number of units and unit price are retained and must only be keyed in when they change.

If after calculating a net line total (first depression of **E**) it is discovered that one or more of the input values has been keyed in erroneously, the following procedure may be used to correct the running subtotal and the grand total:

1. Regardless of which value was in error, key in the same price as a negative number, press **D** and then **E** .
2. Now enter corrected input values for DISC or #, be sure to key in a correct positive value for PRICE and then press **E**.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS	OUTPUT DATA/UNITS
1	Enter program		[ ] [ ]	
2	Initialize (START)		[A] [ ]	0.00
3	Key-in		[ ] [ ]	
	• discount rate	DISC (%)	[B] [ ]	
	• number of units	#	[C] [ ]	
	• price per unit	PRICE	[D] [ ]	
4	Calculate net line total		[E] [ ]	N
5	Optional–display running sub-		[ ] [ ]	
	total		[E] [ ]	S
6	Optional–clear running subtotal		[E] [ ]	0.00
7	Optional–display running		[ ] [ ]	
	grand total		[E] [ ]	G
8	For additional items, same		[ ] [ ]	
	grand total, go to step 3 and		[ ] [ ]	
	change appropriate inputs.		[ ] [ ]	
	For new case (clear everything)		[ ] [ ]	
	go to step 2.		[ ] [ ]	

Example

Problem Statement:

The controller of a small company can take advantage of several discounts if he pays the three bills shown below. What amount should be remitted for each bill, and what is the grand total to be paid?

Bill 1 (2% discount if paid today)

Line Item	# of Units	Unit Price
1	25	$ 2.75
2	60	1.50
3	71	1.50

Bill 2 (2% discount if paid today)

Line Item	# of Units	Unit Price
1	12	$10.50
2	17	$37.20

Bill 3 (3% discount if paid today)

Line Item	# of Units	Unit Price
1	155	$ .28
2	38	.92
3	217	.56

Keystrokes	See Displayed
A 2 B 25 C 2.75 D E →	67.38
60 C 1.50 D E →	88.20
71 C E →	104.37
E →	259.95 (Subtotal—Bill 1)
E →	0.00 (Clear subtotal)
12 C 10.50 D E →	123.48
17 C 37.20 D E →	619.75
E →	743.23 (Subtotal—Bill 2)
E →	0.00 (Clear subtotal)
3 B 155 C .28 D E →	42.10
38 C .92 D E →	33.91
217 C .56 D E →	117.87
E →	193.88 (Subtotal—Bill 3)
E →	0.00 (Clear subtotal)
E →	1197.06 (Grand total)

Appendix A

ENTERING A PROGRAM

Select a program card from the card case supplied with this application pac.

Set W/PRGM-RUN switch to RUN.

Turn the calculator ON. You should see 0.00.

Gently insert the card (printed side up) in the right, lower slot as shown. When the card is part way in, the motor engages it and passes it out the left side of the calculator. Sometimes the motor engages but does not pull the card in. If this happens, push the card a little farther into the machine. Do not impede or force the card; let it move freely. (The display will flash if the card reads improperly. In this case, press [CLX] and reinsert the card.)

When the motor stops, remove the card from the left side of the calculator and insert it in the upper "window slot" on the right side of the calculator.

The program is now stored in the calculator. It remains stored until another program is entered or the calculator is turned off.

Entering a program into the HP-65 does not affect data in the operational stack (including the display) or in storage registers.

Appendix B

THE PRERECORDED MAGNETIC CARDS

The magnetic cards themselves contain important information. The discussion that follows refers to the magnetic card shown above.

The titles, ADD-ON RATE LOAN in this case, suggest the principle intended usage. They are generally the same as the program titles in the Table of Contents, but occasionally they have been shortened because of space limitations.

Mnemonics and abbreviations are printed at the extreme right (e.g., ADD-ON) to facilitate identification when the program cards are in the plastic carrying case.

FIN 1-18A1 is the identification number of the magnetic card shown. It indicates that this card is a member of FINANCE PAC 1 (FIN 1) and that this is the first card (1) of the first release (A) of program number 18. If this were the only card for program 18 the number would have been simply FIN 1-18A. Thus, the presence of a digit at the end of the identification number indicates that there are multiple cards for a single program, and the program instructions should be consulted for proper operation.

Finally, descriptive labels appear above each of the user definable keys for which programmed functions exist. These labels suggest the function to be performed but should not be relied upon until the user has familiarized himself with the individual program instructions. There are several label conventions which apply throughout the pac:

1. Labels that are not enclosed in squares (e.g., N, ODD, AIR, and AMT) identify data input (only) functions.
2. Labels that are enclosed in squares (e.g., [PMT FC]) are used to identify functions that will generate answers (i.e., data output) using the available input values. In most programs, functions so labeled are only used for data output. However, programs 2, 4, 6, 8, 10, 12, 14 and 15 use these functions for both data input and data output (see Appendix D also).

3. User definable keys that have no associated labels should not be pressed. However, most programs alert the user with flashing zeroes when an unlabeled key is pressed by mistake. In addition the original contents of the display and T register are lost. No other damage is done. The user need only press [CLX] and continue operations in sequence. (Programs 14, 21, 22, 28, and 29 do not have this protection. The consequences of pressing an unlabeled key and recovery procedures are described in the instructions for these programs.)

Appendix C

FORMAT OF USER INSTRUCTIONS

The completed User Instruction Form is your guide to operating programs in this pac.

The form is composed of five labeled columns. Reading from left to right, the first column, labeled STEP, gives the instruction step number.

The INSTRUCTIONS column gives instructions and comments concerning the operations to be performed. Operations should be performed in step number sequence, except when they are indicated as being optional or the instruction directs the user to an out of sequence step. However, when there are several operations associated with a single step number, these operations may be performed in any sequence. After pressing a user definable key for either data input or data output operations, any intermediate calculation may be performed so long as it does not affect storage registers required by the program. Finally, since most programs retain input data, reentry of unchanged data is not required unless otherwise indicated.

The INPUT-DATA/UNITS column specifies the input data and the units of data, if applicable. Data input keys consist of the numeric keys [1] to [9], [•] (decimal point), [EEX] (enter exponent), and [CHS] (change sign).

The KEYS column specifies the keys to be pressed. The [ENTER↑] key is shown simply as [↑]. All other designations are identical to those appearing on the HP-65. Ignore any blank spaces in the KEYS columns.

The OUTPUT-DATA/UNITS column specifies intermediate and final outputs and their units, where applicable.

The instructions shown are for Accrued Simple Interest, FIN 1-33A.

STEP	INSTRUCTIONS	INPUT DATA/UNITS	KEYS		OUTPUT DATA/UNITS
1	Enter program				
2	Key in				
	• number of days	DAYS	A		
	• annual interest rate	RATE (%)	B		
	• beginning amount	BEG AMT	C		
3	Calculate either or both:				
	• accrued interest (360 day				
	year)		D		INT 360
	and final amount (optional)		+		FIN AMT
	and/or				
	• accrued interest (365 day				
	year)		E		INT 365
	and final amount (optional)		+		FIN AMT
4	For a new case go to step 2 and				
	change the appropriate values				

STEP 1: The first step in all programs is to enter the prerecorded magnetic card into the HP-65.

STEP 2: The user is asked to key in three data inputs; the data may be keyed in in any sequence.

STEP 3: The user may calculate the accrued interest and final amount two ways. If both sets of values are desired either may be calculated first.

STEP 4: For a different simple interest calculation the user is directed back to step 2 to key in those values that are to be changed (indicating that input data are retained).

Appendix D
ADDITIONAL INFORMATION, PROGRAMS 1-17

General

Programs 1 through 17 solve most of the business problems involving compound interest calculations and eliminate the need for the tables and interpolation formerly associated with the problems.

It is important to note that while these programs are titled according to the envisioned primary use, they are not restricted to the indicated applications. For example program 2 would be used to determine (among other things) the number of periodic payments required to fully amortize a loan. The identical circumstances exist when determining how many periodic withdrawals can be made from a savings account with a given initial deposit. Therefore, program 2 would be used for this problem as well.

Labels Enclosed in a Square

As indicated in Appendix B, functions associated with labels enclosed in a square on the magnetic cards for programs 2, 4, 6, 8, 10, 12, 14, and 15 are both data input and data output functions. To distinguish between data intended for input and a request for a calculation, these functions use a simple technique. The value in the display is tested, and if it is not equal to zero the value is considered input data and is stored in the proper storage register. A value of zero in the display is a request that the appropriate calculation be performed. (While a value of zero has to be in the display to perform the calculation the user is not required to key in zeroes during normal operation—data input functions accomplish this.)

Label Definitions

The labels described below are associated with the same user definable key every time each is used, and they are associated with the same data storage registers throughout the series. A summary of this information is shown on page 5 for quick reference.

n

The label n appears above the **A** key. Its associated value is stored in register 1. Except for program 14, this value is *the total number of payment periods and/or compounding periods.* When both exist, payment periods and compounding periods are assumed to be equal in duration and to occur coincidently. That is, payments occur every time compounding takes place and vice versa.

Often the term of a compound interest problem is stated in years, with other data implying the number of compounding/payment periods per year. A loan, for example, may be quoted as having monthly payments for 30 years (implying that there are 12 compounding/payment periods per year). In this case the proper input data can be determined by multiplying the number of periods per year by the number of years (i.e., 12 x 30 or 360 payments) prior to pressing **A**.

i

The label i appears above the **B** key. The associated value is stored (as a decimal value) in register 2. The value to be input, or generated as output is the *periodic interest rate expressed as a percent.*

The prevailing practice in the United States is to state interest rates (yield, rate of return, growth rate, etc.) as an *annual* percent, intending that this value be divided by the number of compounding periods per year to determine the periodic interest rate. Nominal Interest Rates quoted for savings accounts, the Annual Percentage Rate required by truth-in-lending laws, and Yield to Maturity for bonds are examples of this common practice. Therefore, when the annual interest rate is given in this manner, it should be divided by the number of compounding periods per year prior to pressing the **B** key. Conversely, periodic interest rates generated by pressing **B** have to be multiplied by the number of compounding periods per year to find the annual interest rate.

PMT

This label appears above the **C** key; its associated value is stored in register 3. This value is the *equal periodic payment* occurring once per compounding period for the number of periods associated with n.

Payments may occur at either the beginning of a period or at the end of the period, depending on the problem. Ordinary annuity and payments in arrears are common terms applied to the situation where periodic payments occur at the *end of payment periods.* A direct reduction loan (mortgage) is a prime example of an application belonging in this category. When payments are to be made at *the beginning of payment periods,* they may be referred to as an annuity due or payments in advance. Leases for example, are often constructed as an annuity due.

Programs 2 through 7 and 15 through 17 are for ordinary annuity problems. Programs 8 through 14 address annuities due. To assist you in selecting the program that applies to your particular problem, the descriptions of each program contain a diagram showing the time relationships of the variables involved.

PV

This label appears above the **D** key. Its associated value is stored in register 4. This value is the *initial base amount* (present value, initial principal, initial investment, price, beginning balance, etc.) at *the beginning of the first period.*

FV

This label appears above the **E** key. Its associated value is stored in register 5. This value is the final amount (future value, compounded amount, future sum, etc.) *at the end of the last period.* No program with PMT as a variable uses both PV and FV as variables.

BAL

This label appears above the **E** key and its associated value is stored in register 5. This value is the *balloon payment amount* or remaining balance that occurs *at the end of the last period.*

Programs that use this variable (4, 5, 12, 13) also use n, i, PMT, and PV and are characterized as having a series of equal periodic payments terminated by an unequal payment at the end of the last period. For programs 4 and 5, where payments occur at the end of payment periods, the balloon payment amount is in addition to the last payment.

No program uses both BAL and FV.

Appendix E

OPERATING CHARACTERISTICS

The programs in this pac were designed to accommodate the wide range of values that business conditions can be expected to impose. Since the HP-65 uses a full ten digits for all calculations, a higher level of accuracy is attained than might be achievable with tables, slide rules, and less accurate calculators. There is, however, a possibility that certain values may cause apparent anomalies, and the following material is presented as guidelines to the user. When additional guidelines apply, they appear with the individual program instructions.

Range Limits

Programs 1 through 13 are designed for optimum operation when the input data are positive non-zero values. Negative or zero values may cause the programs to halt with a display of all 9's, zero, or flashing zeros. (See Iterative Solutions below.)

Financial calculations requiring a value for the periodic interest rate (i) should not be performed when that periodic interest rate is very close or equal to zero. Specifically, periodic interest rates between +.0000001% and −.0000001% are not handled.

Solutions for the number of payment and/or compounding periods (n) are not always possible. For example, in program 2, if the periodic payment amount (PMT) is less than the first period's interest charge (PV • i/100), the remaining balance will always be increasing and the loan can never be repaid, no matter how long payments are made. Similiar conditions exist for programs 4, 10, and 12. When these programs attempt to solve for n under these conditions, the result will be a display of flashing zeroes.

Finally, since these programs are subject to the operating limits of the HP-65 itself, extreme values may cause error conditions. For example, if program 1 (Compound Amount) were used to calculate the future value (FV) with n = 2500, i = 10% and PV = 1, the program halts with a display of all 9's indicating that the answer is larger than the machine's capacity.

Iterative Solutions

The mathematical properties of the equations for programs 3, 5, 7, 9, 11, 13, 18, 21, 22, and 31 are such that there is no direct (closed form) solution for the interest rates (i, APR, IRR, and YLD). These programs use an iteration technique to solve for the interest rate. That is, they generate a "best guess" interest rate, test it, improve the answer based on the test, test it again, and so on until an acceptable answer is achieved. How much the answer is improved has a direct bearing on both the accuracy of the answer and the length of time the calculation takes. The programs using this technique produce answers that are accurate to ±.0001%. The time to calculate these answers is also longer than the user will normally experience with other programs. Depending upon input values, it may take minutes to arrive at a solution.

The programs were designed for optimum operation when the interest rate being solved for is between 0 and 100%. These programs will often solve for interest rates outside this range, but occasionally may halt prematurely with flashing zeroes in the display. This is an error condition generated by an intermediate calculation, and indicates that the program cannot solve that particular problem.

Another design assumption associated with these iterative solutions is that all required input data are positive values. Again, the programs often produce satisfactory answers when negative values are used, but they may also halt prematurely with flashing zeroes in the display, indicating that the program cannot solve the problem. More importantly, for programs 5, 13, and 22, a condition can be created such that more than one interest rate is considered correct in a mathematical sense. These programs may in fact calculate and display one of these answers, but have no way of indicating when more than one answer exists or what the other values might be. Therefore, caution should be exercised when negative input values are used in these programs.

Matching Answers With Another Source

Occasionally, apparent discrepancies occur when comparing program answers with those produced by another source. Frequently, these discrepancies will be small, but disconcerting nonetheless, and can often be attributed to a different degree of accuracy maintained by the two sources. Remember, the HP-65 uses a full ten digits. Many tables truncate or round to fewer digits, or require manual interpolation for some values.

Another possible source of these discrepancies is that two slightly different approaches may have been used. Comparing the equations used by the programs with those of sources producing the "different" answers should resolve these questions.

Appendix F

PRINCIPAL EQUATIONS

Unless otherwise stated, all interest rates (i, APR, IRR, NOM, EFF, CR, YLD, etc.) are expressed in decimal form in the equations which follow. Only symbols not defined in the program descriptions are defined here.

Program Number

1 Compound Amount

$$FV = PV\,(1 + i)^n$$

2, 3 Direct Reduction Loan

$$PV = PMT\left[\frac{1 - (1 + i)^{-n}}{i}\right]$$

4, 5 Direct Reduction Loan with Balloon Payment

$$PV = PMT\left[\frac{1 - (1 + i)^{-n}}{i}\right] + BAL\,(1 + i)^{-n}$$

6, 7 Sinking Fund

$$FV = PMT\left[\frac{(1 + i)^n - 1}{i}\right]$$

8, 9 Periodic Savings, Annuity Due

$$FV = PMT\left[\frac{(1 + i)^{n+1} - (1 + i)}{i}\right]$$

10, 11 Present Value, Annuity Due

$$PV = PMT\left[\frac{(1 + i) - (1 + i)^{-n+1}}{i}\right]$$

12, 13 Present Value, Annuity Due with Balloon Payment

$$PV = PMT\left[\frac{(1 + i) - (1 + i)^{-n+1}}{i}\right] + BAL\,(1 + i)^{-n}$$

14 Savings-Compounding Periods Different From Payment Periods

$$\mathrm{PMT} = \frac{\mathrm{FV}}{\mathrm{Z}} \left[\frac{\mathrm{Q}}{(1+\mathrm{Q})^{\mathrm{K}} - 1}\right]$$

when $P/C \leqslant 1$

$$Q = (1 + i)^{C/P} - 1$$

$$Z = (1 + Q)$$

$$K = \#PAY$$

when $P/C > 1$

$$Q = i$$

$$K = (\#PAY) \times (C/P)$$

$$Z = (P/C + 1) \times \left(\frac{Q}{2}\right) + \quad (P/C)$$

15 Nominal to Effective/Effective to Nominal Rate Conversion finite compounding

$$\mathrm{EFF} = \left(1 + \frac{\mathrm{NOM}}{\mathrm{C}}\right)^{\mathrm{C}} - 1$$

continuous compounding

$$\mathrm{EFF} = (e^{\mathrm{NOM}} - 1)$$

16 Accumulated Interest/Remaining Balance

$$\mathrm{BAL_K} = \frac{1}{(1+i)^{-K}} \left[\mathrm{PMT}\, \frac{(1+i)^{-K} - 1}{i} + \mathrm{PV}\right]$$

$$\mathrm{Int}_{J-K} = \mathrm{BAL_K} - \mathrm{BAL}_{J-1} + (K - J + 1) \cdot \mathrm{PMT}$$

17 Amortization Schedule

$$\mathrm{BAL_K} = \frac{1}{(1+i)^{-K}} \left[\mathrm{PMT}\, \frac{(1+i)^{-K} - 1}{i} + \mathrm{PV}\right]$$

k^{th} payment to principal = $\mathrm{BAL}_{K-1} - \mathrm{BAL}_K$

k^{th} payment to interest = $\mathrm{PMT} - (\mathrm{BAL}_{K-1} - \mathrm{BAL}_K)$

Total payment to interest = $(K) \times (\mathrm{PMT}) - (\mathrm{PV} - \mathrm{BAL}_K)$

18 Add-on Rate Installment Loan

$$FC = AMT \cdot \left(\frac{N + h}{12}\right) \cdot AIR$$

$$PMT = \frac{AMT + FC}{N} = AMT\ (1 + i)^h \left[\frac{i}{1 - (1 + i)^{-N}}\right]$$

$$APR = 12i$$

where $h = ODD \cdot 12/365$

19 Constant Payment to Principal Loan Amortization Schedule

$$BAL_K = PV - (K \times CPP)$$

k^{th} payment to interest $= (1 + i)\ BAL_{K-1} = (PMT_i)_K$

k^{th} total payment $= CPP + (PMT_i)_K$

20 Interest Rebate – Rule of 78's

$$REBATE_K = (N - K) \cdot \left[\frac{FC\ (N - K + 1)}{N \times (N + 1)}\right]$$

$$BAL_K = (N - K) \cdot PMT - REBATE_K$$

21, 22 Internal Rate of Return

Solve for IRR in:

$$INV = \sum_{j=1}^{n} \frac{CF_j}{(1 + IRR)^j}$$

where: n = number of cash flows

$CF_j = j^{th}$ cash flow

23 Discounted Cash Flow Analysis – Net Present Value

$$NPV_k = -INV + \sum_{k=1}^{n} \frac{CF_k}{(1 + i)^k}$$

where: n = number of cash flows

$CF_k = k^{th}$ cash flow

NPV_k = net present value after k^{th} cash flow

Depreciation

K = value for YR

$TOTDEP_K$ = total depreciation for years 1 through K.

W = integer portion of LIFE

F = decimal portion of LIFE

(i.e., for a LIFE of 12.25 years W = 12 and F = .25)

24 Straight Line Schedule

$$DEP_K = \frac{SBV - SAL}{LIFE}$$

$$DEP_K \text{ (last year)} = \left(\frac{SBV - SAL}{LIFE}\right) \cdot F$$

$$TOTDEP_K = (K) \cdot \left(\frac{SBV - SAL}{LIFE}\right)$$

$$RDV_K = (LIFE - K) \cdot \left(\frac{SBV - SAL}{LIFE}\right)$$

$$RBV_K = RDV_K + SAL$$

25 Sum-of-the-Years'-Digits Schedule

$$SOYD = \frac{(W + 1)(W + 2F)}{2}$$

$$DEP_K = \left(\frac{LIFE + 1 - K}{SOYD}\right) \cdot (SBV - SAL)$$

$$TOTDEP_K = \left[1 - \frac{(W - K + 1) \times (W - K + 2F)}{2 \times (SOYD)}\right] \cdot (SBV - SAL)$$

$$RDV_K = \left[\frac{(W - K + 1) \times (W - K + 2F)}{2 \times (SOYD)}\right] \cdot (SBV - SAL)$$

$$RBV_K = RDV_K + SAL$$

26 Variable Rate Declining Balance Schedule

$$DEP_K = SBV \cdot \left(1 - \frac{FACT}{LIFE}\right)^{K-1} \cdot \left(\frac{FACT}{LIFE}\right)$$

$$TOTDEP_K = SBV \cdot \left[1 - \left(1 - \frac{FACT}{LIFE}\right)^K\right]$$

$$RDV_K = (SBV - SAL) - TOTDEP_K$$

$$RBV_K = RDV_K + SAL$$

27 Crossover Point – Declining Balance to Straight Line

$$SBV\left(1 - \frac{FACT}{LIFE}\right)^{K-1} \cdot \left(\frac{FACT}{LIFE}\right) > \frac{(SBV - SAL) - TOTDEP_{K-1}}{L + 1 - K}$$

where $TOTDEP_{K-1}$ is determined as shown in program 26.

The largest integer value for K which maintains the above relationship is the "last year" to use the Declining Balance depreciation method.

28 Days Between Dates (Actual)

$$DAYS = f(DT2) - f(DT1)$$

where

$$f(DT) = 365\,(yyyy) + 31\,(mm - 1) + dd + Int\,(z/4) - x$$

and

for $mm \leqslant 2$

$$x = 0, \quad z = (yyyy) - 1$$

for $mm > 2$

$$x = Int\,(.4\,mm + 2.3), \quad z = (yyyy)$$

Int = Integer portion

29 Days Between Dates (30/360 Basis)

$$DAYS = f(DT2) - f(DT1)$$

$$f(DT) = 360(yyyy) + 30\,mm + z$$

for f (DT1)

if $dd_1 = 31$ then, $z = 30$

if $dd_1 \neq 31$ then $z = dd_1$

for f (DT2)

if $dd_2 = 31$ and $dd_1 = 30$ or 31 then $z = 30$

if $dd_2 = 31$ and $dd_1 < 30$ then $z = dd_2$

if $dd_2 < 31$ then $z = dd_2$

30,31,32 Bond Price and Yield

for PER > 1

$$PRICE = RV\left(1 + \frac{YLD}{2}\right)^{-PER} + 100\,\frac{CR}{YLD}\left[\left(1 + \frac{YLD}{2}\right)^{J} - \left(1 + \frac{YLD}{2}\right)^{-PER}\right] - 100\left(\frac{CR}{2}\right)J$$

where $J = 1 - FRAC(PER)$

FRAC (PER) = fractional portion of the number of remaining coupon periods

i.e., if PER = 12.6, FRAC (PER) = .6, and J = 1 − .6 = .4

for PER < 1

$$PRICE = \frac{RV + \frac{CR}{2}}{1 - \frac{YLD}{2} \cdot PER}$$

33 Accrued Simple Interest

$$INT\ 360 = \frac{DAYS}{360} \cdot BEG\ AMT \cdot RATE$$

$$\text{INT } 365 = \frac{\text{DAYS}}{365} \cdot \text{BEG AMT} \cdot \text{RATE}$$

34 Linear Regression

for $y = b + m\,x$

$$m = \frac{\Sigma x_i y_i - \dfrac{\Sigma x_i \Sigma y_i}{n}}{\Sigma x_i^2 - \dfrac{(\Sigma x_i)^2}{n}}$$

$$b = \bar{y} - m\,\bar{x}$$

where

$$\bar{x} = \frac{\Sigma x_i}{n} \qquad \bar{y} = \frac{\Sigma y_i}{n}$$

$$r^2 = \frac{\left[\Sigma x_i y_i - \dfrac{\Sigma x_i \Sigma y_i}{n}\right]^2}{\left[\Sigma x_i^2 - \dfrac{(\Sigma x_i)^2}{n}\right]\left[\Sigma y_i^2 - \dfrac{(\Sigma y_i)^2}{n}\right]}$$

n = number of data pairs

35 Exponential Curve Fit

$$y = be^{mx} \qquad (b > 0)$$

$$m = \frac{\Sigma x_i \ln y_i - \dfrac{1}{n}(\Sigma x_i)(\Sigma \ln y_i)}{\Sigma x_i^2 - \dfrac{1}{n}(\Sigma x_i)^2}$$

$$b = \exp\left[\frac{\Sigma \ln y_i}{n} - m\,\frac{\Sigma x_i}{n}\right]$$

$$r^2 = \frac{\left[\Sigma x_i \ln y_i - \dfrac{1}{n}\Sigma x_i \, \Sigma \ln y_i\right]^2}{\left[\Sigma x_i^2 - \dfrac{(\Sigma x_i)^2}{n}\right]\left[\Sigma(\ln y_i)^2 - \dfrac{(\Sigma \ln y_i)^2}{n}\right]}$$

n = number of data pairs

36 Total, Average, and Percent of Total (Up to 8 Items)

$$TOT = x_1 + x_2 \ldots x_N$$

$$AVG = \frac{TOT}{N}, \quad (\%)_K = \frac{x_K}{TOT} \times 100$$

where N = number of items ($N \leqslant 8$)

37 Moving Averages

$$AVG_K = \frac{x_K + x_{K+1} + \ldots x_{K+N-1}}{N}$$

where N = number of items in moving average ($N \leqslant 6$)
K = the k^{th} item in a series of items

38 Invoicing

$$\text{Net line total} = \left(\text{Price} - \text{Price} \times \frac{DISC}{100}\right) \cdot (\#)$$

PROGRAM LISTINGS

COMPOUND AMOUNT

KEYS	CODE
LBL	23
A	11
STO 1	33 01
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 4	34 04
÷	81
f	31
LN	07
RCL 2	34 02
1	01
+	61
f	31
LN	07
÷	81
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 4	34 04
÷	81
RCL 1	34 01
g	35

KEYS	CODE
$^1/x$	04
g	35
y^x	05
1	01
−	51
STO 2	33 02
EEX	43
2	02
x	71
RTN	24
LBL	23
D	14
STO 4	33 04
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 2	34 02
1	01
+	61
RCL 1	34 01
g	35
y^x	05
÷	81
STO 4	33 04
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
0	00
RTN	24
RCL 4	34 04

KEYS	CODE
RCL 2	34 02
1	01
+	61
RCL 1	34 01
g	35
y^x	05
x	71
STO 5	33 05
RTN	24
LBL	23
C	13
0	00
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4 PV	R_7
R_2 i/100	R_5 FV	R_8
R_3	R_6	R_9 Used

DIRECT REDUCTION LOAN
SOLVE FOR n, PMT, or PV

KEYS	CODE	KEYS	CODE	KEYS	CODE
LBL	23	STO 3	33 03	y^x	05
A	11	0	00	–	51
STO 1	33 01	g x≠y	35 21	RCL 2	34 02
0	00	0	00	÷	81
g x≠y	35 21	RTN	24	x	71
0	00	RCL 4	34 04	STO 4	33 04
RTN	24	1	01	RTN	24
1	01	RCL 2	34 02	LBL	23
RCL 4	34 04	1	01	E	15
RCL 3	34 03	+	61	0	00
÷	81	RCL 1	34 01	÷	81
RCL 2	34 02	CHS	42	RTN	24
x	71	g	35	g NOP	35 01
–	51	y^x	05	g NOP	35 01
f	31	–	51	g NOP	35 01
LN	07	RCL 2	34 02	g NOP	35 01
1	01	÷	81	g NOP	35 01
RCL 2	34 02	÷	81	g NOP	35 01
+	61	STO 3	33 03	g NOP	35 01
f	31	RTN	24	g NOP	35 01
LN	07	LBL	23	g NOP	35 01
÷	81	D	14	g NOP	35 01
CHS	42	STO 4	33 04	g NOP	35 01
STO 1	33 01	0	00	g NOP	35 01
RTN	24	g x≠y	35 21	g NOP	35 01
LBL	23	0	00	g NOP	35 01
B	12	RTN	24	g NOP	35 01
EEX	43	RCL 3	34 03	g NOP	35 01
2	02	1	01	g NOP	35 01
÷	81	RCL 2	34 02	g NOP	35 01
STO 2	33 02	1	01		
0	00	+	61		
RTN	24	RCL 1	34 01		
LBL	23	CHS	42		
C	13	g	35		

R_1 n	R_4 PV	R_7
R_2 i/100	R_5	R_8
R_3 PMT	R_6	R_9 Used

DIRECT REDUCTION LOAN SOLVE FOR INTEREST RATE (i)

KEYS	CODE
0	00
÷	81
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
B	12
RCL 3	34 03
RCL 4	34 04
÷	81
↑	41
g	35
$1/x$	04
RCL 1	34 01
↑	41
x	71
÷	81
–	51
STO 2	33 02
0	00
g x=y	35 23
RTN	24
g NOP	35 01
LBL	23
1	01
RCL 2	34 02

KEYS	CODE
1	01
+	61
STO 6	33 06
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
RCL 4	34 04
RCL 3	34 03
÷	81
RCL 2	34 02
x	71
1	01
–	51
x	71
1	01
+	61
RCL 2	34 02
x	71
g LST X	35 00
RCL 1	34 01
x	71
RCL 6	34 06
÷	81
RCL 7	34 07
–	51
1	01
+	61
÷	81
STO	33
+	61
2	02
g	35
ABS	06
EEX	43

KEYS	CODE
CHS	42
6	06
g x≤y	35 22
GTO	22
1	01
RCL 2	34 02
EEX	43
2	02
x	71
R/S	84
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4 PV	R_7 $(1 + i/100)^n$
R_2 i/100	R_5	R_8
R_3 PMT	R_6 1 + i/100	R_9 Used

DIRECT REDUCTION LOAN WITH BALLOON PAYMENT SOLVE FOR n, PMT, PV, or BAL

KEYS	CODE
STO 1	33 01
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 3	34 03
RCL 2	34 02
÷	81
−	51
RCL 4	34 04
g LST X	35 00
−	51
÷	81
f	31
LN	07
1	01
RCL 2	34 02
+	61
f	31
LN	07
÷	81
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
0	00
g x≠y	35 21
−	51
STO 2	33 02
1	01
RCL 2	34 02

KEYS	CODE
1	01
+	61
RCL 1	34 01
CHS	42
g	35
y^x	05
STO 6	33 06
−	51
RCL 2	34 02
÷	81
STO 7	33 07
0	00
RTN	24
LBL	23
C	13
STO 3	33 03
0	00
g x≠y	35 21
0	00
RTN	24
B	12
RCL 4	34 04
RCL 5	34 05
RCL 6	34 06
x	71
−	51
RCL 7	34 07
÷	81
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
0	00
g x≠y	35 21

KEYS	CODE
0	00
RTN	24
B	12
RCL 7	34 07
RCL 3	34 03
x	71
RCL 5	34 05
RCL 6	34 06
x	71
+	61
STO 4	33 04
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
0	00
RTN	24
B	12
RCL 4	34 04
RCL 3	34 03
RCL 7	34 07
x	71
−	51
RCL 6	34 06
÷	81
STO 5	33 05
RTN	24
g NOP	35 01

R_1 n	R_4 PV	R_7 $[1-(1+i)^{-n}]/i$
R_2 i/100	R_5 BAL	R_8
R_3 PMT	R_6 $(1+i)^{-n}$	R_9 Used

DIRECT REDUCTION LOAN WITH BALLOON PAYMENT SOLVE FOR i

KEYS	CODE	KEYS	CODE	KEYS	CODE
STO 1	33 01	RCL 2	34 02	RCL 3	34 03
RTN	24	1	01	÷	81
LBL	23	+	61	RCL 6	34 06
C	13	STO 6	33 06	÷	81
STO 3	33 03	RCL 1	34 01	−	51
RTN	24	g	35	÷	81
LBL	23	y^x	05	STO	33
D	14	STO 7	33 07	+	61
STO 4	33 04	−	51	2	02
RTN	24	g LST X	35 00	g	35
LBL	23	RCL 4	34 04	ABS	06
E	15	x	71	EEX	43
STO 5	33 05	RCL 5	34 05	CHS	42
RTN	24	−	51	6	06
LBL	23	RCL 3	34 03	g x≤y	35 22
B	12	÷	81	GTO	22
RCL 1	34 01	RCL 2	34 02	1	01
RCL 3	34 03	x	71	RCL 2	34 02
x	71	+	61	EEX	43
RCL 4	34 04	RCL 1	34 01	2	02
−	51	RCL 6	34 06	x	71
RCL 5	34 05	÷	81	R/S	84
+	61	RCL 2	34 02	g NOP	35 01
RCL 1	34 01	g	35	g NOP	35 01
÷	81	$^1/x$	04	g NOP	35 01
RCL 4	34 04	+	61	g NOP	35 01
÷	81	RCL 7	34 07	g NOP	35 01
STO 2	33 02	RCL 2	34 02	g NOP	35 01
0	00	÷	81	g NOP	35 01
g x=y	35 23	−	51	g NOP	35 01
RTN	24	RCL 1	34 01		
g NOP	35 01	RCL 2	34 02		
LBL	23	x	71		
1	01	RCL 5	34 05		
1	01	x	71		

R_1 n	R_4 PV	R_7 $(1 + i/100)^n$
R_2 i/100	R_5 BAL	R_8
R_3 PMT	R_6 (1 + i/100)	R_9 Used

SINKING FUND
SOLVE FOR n, PMT or FV

KEYS	CODE
LBL	23
A	11
STO 1	33 01
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 3	34 03
÷	81
RCL 2	34 02
x	71
1	01
+	61
f	31
LN	07
1	01
RCL 2	34 02
+	61
f	31
LN	07
÷	81
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
0	00
RTN	24
LBL	23
C	13
STO 3	33 03

KEYS	CODE
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 2	34 02
x	71
1	01
RCL 2	34 02
+	61
RCL 1	34 01
g	35
y^x	05
1	01
–	51
÷	81
STO 3	33 03
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
0	00
RTN	24
RCL 3	34 03
RCL 2	34 02
÷	81
1	01
RCL 2	34 02
+	61
RCL 1	34 01
g	35
y^x	05
1	01

KEYS	CODE
–	51
x	71
STO 5	33 05
RTN	24
LBL	23
D	14
0	00
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4	R_7
R_2 i/100	R_5 FV	R_8
R_3 PMT	R_6	R_9 Used

SINKING FUND SOLVE FOR i

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
E	15
STO 5	33 05
RTN	24
LBL	23
B	12
RCL 5	34 05
RCL 3	34 03
÷	81
STO 6	33 06
RCL 1	34 01
–	51
g LST X	35 00
1	01
–	51
↑	41
x	71
RCL 6	34 06
+	61
÷	81
2	02
x	71
0	00
g x=y	35 23
RTN	24
g NOP	35 01
g R↓	35 08

KEYS	CODE
STO 2	33 02
LBL	23
1	01
RCL 2	34 02
1	01
+	61
STO 6	33 06
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
1	01
–	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
RCL 5	34 05
–	51
RCL 1	34 01
RCL 2	34 02
x	71
RCL 7	34 07
RCL 6	34 06
÷	81
x	71
1	01
+	61
RCL 7	34 07
–	51
RCL 2	34 02
↑	41
x	71
÷	81
RCL 3	34 03

KEYS	CODE
x	71
÷	81
STO	33
–	51
2	02
g	35
ABS	06
EEX	43
6	06
CHS	42
g x≤y	35 22
GTO	22
1	01
RCL 2	34 02
EEX	43
2	02
x	71
RTN	24
LBL	23
D	14
0	00
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4	R_7 $(1 + i/100)^n$
R_2 i/100	R_5 FV	R_8
R_3 PMT	R_6 Used, (1 + i/100)	R_9 Used

PERIODIC SAVINGS, ANNUITY DUE
SOLVE FOR n, PMT or FV

KEYS	CODE
LBL	23
A	11
STO 1	33 01
0	00
g $x \neq y$	35 21
0	00
RTN	24
RCL 5	34 05
RCL 3	34 03
÷	81
RCL 2	34 02
x	71
g LST X	35 00
1	01
+	61
↑	41
g R↓	35 08
+	61
f	31
LN	07
g R↑	35 09
f	31
LN	07
÷	81
1	01
–	51
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
0	00

KEYS	CODE
RTN	24
LBL	23
C	13
STO 3	33 03
0	00
g $x \neq y$	35 21
0	00
RTN	24
1	01
RCL 2	34 02
+	61
STO 6	33 06
RCL 1	34 01
1	01
+	61
g	35
y^x	05
RCL 6	34 06
–	51
RCL 2	34 02
÷	81
RCL 5	34 05
g $x \rightleftarrows y$	35 07
÷	81
STO 3	33 03
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g $x \neq y$	35 21
0	00
RTN	24
1	01
RCL 2	34 02

KEYS	CODE
+	61
STO 6	33 06
RCL 1	34 01
1	01
+	61
g	35
y^x	05
RCL 6	34 06
–	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
STO 5	33 05
RTN	24
LBL	23
D	14
0	00
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4	R_7
R_2 i/100	R_5 FV	R_8
R_3 PMT	R_6 (1 + i/100)	R_9 Used

PERIODIC SAVINGS, ANNUITY DUE
SOLVE FOR i

KEYS	CODE
STO 1	33 01
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
0	00
÷	81
RTN	24
LBL	23
E	15
STO 5	33 05
RTN	24
LBL	23
B	12
RCL 5	34 05
RCL 3	34 03
÷	81
STO 6	33 06
RCL 1	34 01
–	51
2	02
x	71
RCL 1	34 01
↑	41
x	71
RCL 6	34 06
+	61
÷	81
STO 2	33 02
0	00
g x=y	35 23
RTN	24

KEYS	CODE
g NOP	35 01
LBL	23
1	01
RCL 2	34 02
1	01
+	61
STO 6	33 06
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
RCL 6	34 06
x	71
g LST X	35 00
–	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
RCL 5	34 05
–	51
RCL 1	34 01
1	01
+	61
RCL 7	34 07
x	71
1	01
–	51
RCL 2	34 02
x	71
RCL 7	34 07
RCL 6	34 06
x	71
g LST X	35 00
–	51

KEYS	CODE
–	51
RCL 2	34 02
↑	41
x	71
÷	81
RCL 3	34 03
x	71
÷	81
STO	33
–	51
2	02
g	35
ABS	06
EEX	43
6	06
CHS	42
g x≤y	35 22
GTO	22
1	01
RCL 2	34 02
EEX	43
2	02
x	71
R/S	84
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4	R_7 $(1 + i/100)^n$
R_2 i/100	R_5 FV	R_8
R_3 PMT	R_6 1 + i/100	R_9 Used

PRESENT VALUE, ANNUITY DUE
SOLVE FOR n, PMT, or PV

KEYS	CODE
0	00
÷	81
LBL	23
A	11
STO 1	33 01
0	00
g x≠y	35 21
0	00
RTN	24
1	01
RCL 2	34 02
+	61
g	35
1/x	04
f	31
LN	07
g LST X	35 00
RCL 4	34 04
x	71
RCL 2	34 02
x	71
RCL 3	34 03
÷	81
CHS	42
1	01
+	61
f	31
LN	07
g x⇄y	35 07
÷	81
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43

KEYS	CODE
2	02
÷	81
STO 2	33 02
0	00
RTN	24
LBL	23
C	13
STO 3	33 03
0	00
g x≠y	35 21
0	00
RTN	24
RCL 4	34 04
1	01
RCL 2	34 02
+	61
÷	81
g LST X	35 00
RCL 1	34 01
g	35
y^x	05
g	35
1/x	04
CHS	42
1	01
+	61
RCL 2	34 02
÷	81
÷	81
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
0	00

KEYS	CODE
g x≠y	35 21
0	00
RTN	24
RCL 3	34 03
1	01
RCL 2	34 02
+	61
x	71
g LST X	35 00
RCL 1	34 01
g	35
y^x	05
g	35
1/x	04
CHS	42
1	01
+	61
RCL 2	34 02
÷	81
x	71
STO 4	33 04
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4 PV	R_7
R_2 i/100	R_5	R_8
R_3 PMT	R_6	R_9 Used

PRESENT VALUE, ANNUITY DUE
SOLVE FOR i

KEYS	CODE
0	00
÷	81
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
B	12
RCL 3	34 03
RCL 4	34 04
RCL 3	34 03
–	51
÷	81
g LST X	35 00
RCL 3	34 03
x	71
RCL 1	34 01
↑	41
x	71
x	71
RCL 4	34 04
↑	41
x	71
g x⇄y	35 07
÷	81
–	51
STO 2	33 02

KEYS	CODE
0	00
g x=y	35 23
0	00
RTN	24
LBL	23
1	01
RCL 2	34 02
1	01
+	61
STO 6	33 06
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
RCL 4	34 04
RCL 2	34 02
x	71
RCL 3	34 03
÷	81
RCL 6	34 06
–	51
x	71
RCL 6	34 06
+	61
RCL 2	34 02
x	71
g LST X	35 00
RCL 1	34 01
x	71
RCL 7	34 07
–	51
1	01
+	61
÷	81
STO	33

KEYS	CODE
+	61
2	02
g	35
ABS	06
EEX	43
CHS	42
6	06
g x≤y	35 22
GTO	22
1	01
RCL 2	34 02
EEX	43
2	02
x	71
R/S	84
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4 PV	R_7 $(1 + i/100)^n$
R_2 i/100	R_5	R_8
R_3 PMT	R_6 (1 + i/100)	R_9 Used

PRESENT VALUE, ANNUITY DUE WITH BALLOON PAYMENT SOLVE FOR n, PMT, PV, or BAL

KEYS	CODE
STO 1	33 01
0	00
g x≠y	35 21
0	00
RTN	24
RCL 5	34 05
RCL 6	34 06
RCL 3	34 03
x	71
RCL 2	34 02
÷	81
−	51
RCL 4	34 04
g LST X	35 00
−	51
÷	81
f	31
LN	07
RCL 6	34 06
f	31
LN	07
÷	81
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
0	00
g x≠y	35 21
−	51
STO 2	33 02
1	01
RCL 2	34 02

KEYS	CODE
1	01
+	61
STO 6	33 06
RCL 1	34 01
CHS	42
g	35
y^x	05
STO 8	33 08
−	51
RCL 2	34 02
÷	81
RCL 6	34 06
x	71
STO 7	33 07
RCL 3	34 03
x	71
RCL 8	34 08
RCL 5	34 05
x	71
0	00
RTN	24
LBL	23
C	13
STO 3	33 03
0	00
g x≠y	35 21
0	00
RTN	24
B	12
g x⇄y	35 07
CHS	42
RCL 4	34 04
+	61
RCL 7	34 07
÷	81

KEYS	CODE
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
0	00
g x≠y	35 21
0	00
RTN	24
B	12
g R↓	35 08
+	61
STO 4	33 04
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
0	00
RTN	24
B	12
RCL 4	34 04
g R↑	35 09
−	51
RCL 8	34 08
÷	81
STO 5	33 05
RTN	24
g NOP	35 01

R_1 n	R_4 PV	R_7 Q
R_2 i/100	R_5 BAL	R_8 $(1 + i/100)^{-n}$
R_3 PMT	R_6 1 + i/100	R_9 Used

PRESENT VALUE, ANNUITY DUE WITH BALLOON PAYMENT SOLVE FOR i

KEYS	CODE
STO 1	33 01
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
STO 5	33 05
RTN	24
LBL	23
B	12
RCL 1	34 01
RCL 3	34 03
x	71
RCL 4	34 04
—	51
RCL 5	34 05
+	61
RCL 4	34 04
RCL 3	34 03
—	51
÷	81
RCL 1	34 01
÷	81
STO 2	33 02
0	00
g x=y	35 23
RTN	24
LBL	23
1	01

KEYS	CODE
RCL 2	34 02
1	01
+	61
STO 6	33 06
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
RCL 4	34 04
x	71
RCL 5	34 05
—	51
RCL 3	34 03
÷	81
RCL 2	34 02
x	71
RCL 7	34 07
—	51
RCL 7	34 07
RCL 2	34 02
x	71
—	51
RCL 6	34 06
+	61
RCL 1	34 01
1	01
—	51
RCL 7	34 07
RCL 2	34 02
÷	81
—	51
RCL 6	34 06
RCL 2	34 02
÷	81
+	61

KEYS	CODE
RCL 5	34 05
RCL 2	34 02
x	71
RCL 1	34 01
x	71
RCL 6	34 06
÷	81
RCL 3	34 03
÷	81
—	51
÷	81
STO	33
+	61
2	02
g	35
ABS	06
EEX	43
CHS	42
6	06
g x≤y	35 22
GTO	22
1	01
RCL 2	34 02
EEX	43
2	02
x	71
R/S	84
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 n	R_4 PV	R_7 $(1 + i/100)^n$
R_2 i/100	R_5 BAL	R_8
R_3 PMT	R_6 $(1 + i/100)$	R_9 Used

SAVINGS–COMPOUNDING PERIODS DIFFERENT FROM PAYMENT PERIODS

KEYS	CODE
STO 3	33 03
0	00
g x≠y	35 21
RTN	24
RTN	24
D	14
RCL 5	34 05
g x⇄y	35 07
÷	81
STO 3	33 03
RTN	24
LBL	23
A	11
STO 1	33 01
0	00
RTN	24
LBL	23
A	11
f^{-1}	32
SF 1	51
STO 6	33 06
1	01
–	51
0	00
g x>y	35 24
f	31
SF 1	51
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
RTN	24
RTN	24

KEYS	CODE
D	14
RCL 3	34 03
x	71
STO 5	33 05
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
0	00
RTN	24
LBL	23
D	14
RCL 6	34 06
g	35
1/x	04
RCL 1	34 01
f^{-1}	32
TF 1	61
GTO	22
1	01
RCL 2	34 02
1	01
+	61
g R↑	35 09
g	35
y^x	05
1	01
–	51
STO 7	33 07
1	01
+	61
GTO	22

KEYS	CODE
2	02
LBL	23
1	01
x	71
RCL 2	34 02
STO 7	33 07
2	02
÷	81
RCL 6	34 06
1	01
+	61
x	71
RCL 6	34 06
+	61
LBL	23
2	02
g x⇄y	35 07
RCL 7	34 07
1	01
+	61
g x⇄y	35 07
g	35
y^x	05
1	01
–	51
x	71
RCL 7	34 07
÷	81
RTN	24
g NOP	35 01

R_1 #PAY	R_4	R_7 Q
R_2 i/100	R_5 FV	R_8
R_3 PMT	R_6 P/C	R_9 Used

NOMINAL TO EFFECTIVE/EFFECTIVE TO NOMINAL RATE CONVERSION

KEYS	CODE
STO 1	33 01
0	00
RTN	24
LBL	23
B	12
STO 2	33 02
0	00
g x≠y	35 21
RTN	24
RTN	24
RCL 3	34 03
EEX	43
2	02
÷	81
1	01
+	61
RCL 1	34 01
g	35
$^1/x$	04
g	35
y^x	05
1	01
−	51
RCL 1	34 01
x	71
EEX	43
2	02
x	71
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
0	00
g x≠y	35 21

KEYS	CODE
RTN	24
RTN	24
RCL 2	34 02
RCL 1	34 01
EEX	43
2	02
x	71
÷	81
1	01
+	61
RCL 1	34 01
g	35
y^x	05
1	01
−	51
EEX	43
2	02
x	71
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
0	00
g x≠y	35 21
RTN	24
RTN	24
RCL 5	34 05
EEX	43
2	02
÷	81
1	01
+	61
f	31
LN	07

KEYS	CODE
EEX	43
2	02
x	71
STO 4	33 04
RTN	24
LBL	23
E	15
STO 5	33 05
0	00
g x≠y	35 21
RTN	24
RTN	24
RCL 4	34 04
EEX	43
2	02
÷	81
f^{-1}	32
LN	07
1	01
−	51
EEX	43
2	02
x	71
STO 5	33 05
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 C/YR	R_4 NOM	R_7
R_2 NOM	R_5 EFF Continuous	R_8
R_3 EFF	R_6	R_9 Used

DIRECT REDUCTION LOAN
ACCUMULATED INTEREST/REMAINING BALANCE

KEYS	CODE
LBL	23
A	11
RCL 1	34 01
STO 8	33 08
g x⇄y	35 07
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 8	34 08
g x≤y	35 22
GTO	22
1	01
STO 1	33 01
g R↓	35 08
STO 8	33 08
LBL	23
1	01
RCL 2	34 02

KEYS	CODE
1	01
+	61
RCL 1	34 01
CHS	42
g	35
y^x	05
STO 6	33 06
1	01
−	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
RCL 4	34 04
+	61
RCL 6	34 06
÷	81
STO 5	33 05
1	01
RCL 2	34 02
+	61
RCL 8	34 08
1	01
−	51
CHS	42
g	35
y^x	05
STO 6	33 06
1	01
−	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
RCL 4	34 04

KEYS	CODE
+	61
RCL 6	34 06
÷	81
RCL 5	34 05
−	51
CHS	42
RCL 1	34 01
RCL 8	34 08
−	51
1	01
+	61
RCL 3	34 03
x	71
+	61
RTN	24
LBL	23
E	15
RCL 5	34 05
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 K	R_4 PV	R_7
R_2 i/100	R_5 BAL_k	R_8 J
R_3 PMT	R_6 $(1 + i/100)^{-k}$	R_9 Used

DIRECT REDUCTION LOAN AMORTIZATION SCHEDULE

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
g LST X	35 00
x	71
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
1	01
RCL 2	34 02
+	61
STO 8	33 08
RCL 1	34 01
CHS	42
g	35
y^x	05
STO 6	33 06
1	01
−	51
RCL 2	34 02

KEYS	CODE
÷	81
RCL 3	34 03
x	71
RCL 4	34 04
+	61
RCL 6	34 06
÷	81
STO 5	33 05
RCL 8	34 08
RCL 1	34 01
1	01
−	51
CHS	42
g	35
y^x	05
STO 6	33 06
1	01
−	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
RCL 4	34 04
+	61
RCL 6	34 06
÷	81
CHS	42
RCL 5	34 05
+	61
CHS	42
STO 7	33 07
RCL 3	34 03
g $x \rightleftarrows y$	35 07
−	51
RTN	24

KEYS	CODE
LBL	23
E	15
RCL 7	34 07
RTN	24
LBL	23
E	15
RCL 5	34 05
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 3	34 03
x	71
RCL 4	34 04
RCL 5	34 05
−	51
−	51
RTN	24
LBL	23
E	15
RCL 1	34 01
1	01
+	61
STO 1	33 01
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 K	R_4 PV	R_7 PMT to PRIN
R_2 i/100	R_5 BAL_K	R_8 (1 + i)
R_3 PMT	R_6 $(1 + i)^{-K}$	R_9

ADD-ON RATE INSTALLMENT LOAN (CARD 1)

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
STO 6	33 06
1	01
2	02
x	71
3	03
6	06
5	05
÷	81
STO 2	33 02
RCL 6	34 06
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 2	34 02
+	61
1	01
2	02
÷	81
RCL 3	34 03
x	71

KEYS	CODE
EEX	43
2	02
÷	81
RCL 4	34 04
x	71
STO 6	33 06
RCL 4	34 04
+	61
RCL 1	34 01
÷	81
STO 5	33 05
RTN	24
LBL	23
E	15
RCL 6	34 06
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 N	R_4 AMT	R_7
R_2 ODD	R_5 PMT	R_8
R_3 AIR	R_6 FC	R_9

ADD-ON RATE INSTALLMENT LOAN (CARD 2)

KEYS	CODE
0	00
÷	81
LBL	23
A	11
RCL 3	34 03
1	01
2	02
EEX	43
2	02
÷	81
0	00
g x=y	35 23
RTN	24
g NOP	35 01
g R↓	35 08
STO 6	33 06
LBL	23
1	01
1	01
RCL 6	34 06
1	01
+	61
STO 7	33 07
RCL 1	34 01
CHS	42
g	35
y^x	05
STO 8	33 08
−	51
RCL 6	34 06
÷	81
RCL 5	34 05
x	71
RCL 7	34 07
RCL 2	34 02

KEYS	CODE
g	35
y^x	05
RCL 4	34 04
x	71
−	51
RCL 8	34 08
RCL 7	34 07
÷	81
RCL 1	34 01
1	01
+	61
x	71
RCL 6	34 06
x	71
1	01
RCL 8	34 08
−	51
RCL 6	34 06
+	61
−	51
RCL 6	34 06
↑	41
x	71
÷	81
RCL 5	34 05
x	71
RCL 7	34 07
RCL 2	34 02
g	35
y^x	05
RCL 7	34 07
÷	81
RCL 2	34 02
g x⇄y	35 07
x	71

KEYS	CODE
g LST X	35 00
−	51
RCL 4	34 04
x	71
−	51
÷	81
RCL 6	34 06
g x⇄y	35 07
−	51
STO 6	33 06
g LST X	35 00
g	35
ABS	06
EEX	43
6	06
CHS	42
g x≤y	35 22
GTO	22
1	01
RCL 6	34 06
1	01
2	02
0	00
0	00
x	71
R/S	84
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1	N	R_4	AMT	R_7	1 + i/100
R_2	ODD	R_5	PMT	R_8	$(1 + i/100)^{-N}$
R_3	AIR	R_6	APR/100	R_9	Used

CONSTANT PAYMENT TO PRINCIPAL LOAN AMORTIZATION SCHEDULE

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
EEX	43
2	02
x	71
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 4	34 04
RCL 3	34 03
RCL 1	34 01
x	71
–	51
STO 5	33 05
RCL 3	34 03
+	61
RCL 2	34 02
x	71
STO 6	33 06

KEYS	CODE
RCL 3	34 03
+	61
1	01
STO	33
+	61
1	01
RCL 6	34 06
RTN	24
LBL	23
E	15
RCL 6	34 06
RCL 3	34 03
+	61
RTN	24
LBL	23
E	15
RCL 5	34 05
RTN	24
LBL	23
E	15
2	02
RCL 1	34 01
–	51
RCL 3	34 03
x	71
RCL 4	34 04
÷	81
2	02
+	61
2	02
÷	81
RCL 1	34 01
1	01
–	51
x	71

KEYS	CODE
RCL 2	34 02
x	71
RCL 4	34 04
x	71
RTN	24
LBL	23
E	15
RCL 1	34 01
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 K	R_4 PV	R_7
R_2 i/100	R_5 BAL	R_8
R_3 CPP	R_6 PMT_i	R_9

INTEREST REBATE—RULE OF 78's

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 2	34 02
−	51
1	01
+	61
RCL 4	34 04
x	71
RCL 1	34 01
↑	41
x	71
g LST X	35 00
+	61
÷	81
RCL 1	34 01
RCL 2	34 02
−	51
x	71

KEYS	CODE
STO 5	33 05
RTN	24
LBL	23
E	15
RCL 3	34 03
RCL 1	34 01
RCL 2	34 02
−	51
x	71
RCL 5	34 05
−	51
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 N	R_4 FC	R_7
R_2 K	R_5 REB	R_8
R_3 PMT	R_6	R_9

INTERNAL RATE OF RETURN UP TO 12 CASH FLOWS (CARD 1)

KEYS	CODE
f	31
REG	43
f^{-1}	32
SF 1	51
2	02
x	71
STO 2	33 02
STO 1	33 01
2	02
÷	81
RTN	24
LBL	23
B	12
E	15
STO	33
+	61
3	03
g R↓	35 08
RTN	24
LBL	23
B	12
E	15
STO	33
+	61
4	04
g R↓	35 08
RTN	24
LBL	23
B	12
E	15
STO	33
+	61
5	05
g R↓	35 08
RTN	24

KEYS	CODE
LBL	23
B	12
E	15
STO	33
+	61
6	06
g R↓	35 08
RTN	24
LBL	23
B	12
E	15
STO	33
+	61
7	07
g R↓	35 08
RTN	24
LBL	23
B	12
E	15
STO	33
+	61
8	08
RCL 1	34 01
EEX	43
5	05
÷	81
STO 1	33 01
f	31
SF 1	51
g R↑	35 09
RTN	24
LBL	23
E	15
↑	41
STO	33

KEYS	CODE
+	61
9	09
RCL 1	34 01
÷	81
f	31
TF 1	61
f	31
INT	83
RTN	24
LBL	23
C	13
↑	41
STO	33
÷	81
9	09
RCL 2	34 02
÷	81
STO 1	33 01
RCL	34
9	09
•	83
1	01
x	71
•	83
9	09
+	61
STO 2	33 02
g R↑	35 09
RTN	24
g NOP	35 01

R_1 INV/2 CF MAX	R_4 $CF_8 \cdot CF_2$	R_7 $CF_{11} \cdot CF_5$
R_2 2 CF MAX	R_5 $CF_9 \cdot CF_3$	R_8 $CF_{12} \cdot CF_6$
R_3 $CF_7 \cdot CF_1$	R_6 $CF_{10} \cdot CF_4$	R_9 Σ CF

INTERNAL RATE OF RETURN UP TO 12 CASH FLOWS (CARD 2)

KEYS	CODE
0	00
STO	33
9	09
RCL 2	34 02
f^{-1}	32
SF 1	51
LBL	23
1	01
1	01
RCL 8	34 08
E	15
2	02
RCL 7	34 07
E	15
3	03
RCL 6	34 06
E	15
4	04
RCL 5	34 05
E	15
5	05
RCL 4	34 04
E	15
6	06
RCL 3	34 03
E	15
f	31
TF 1	61
GTO	22
2	02
f	31
SF 1	51
GTO	22
1	01
LBL	23

KEYS	CODE
2	02
RCL	34
9	09
RCL 1	34 01
–	51
g $x \rightleftarrows y$	35 07
÷	81
RCL 2	34 02
g $x \rightleftarrows y$	35 07
+	61
STO 2	33 02
g LST X	35 00
g	35
ABS	06
EEX	43
5	05
CHS	42
g $x \leq y$	35 22
GTO	22
A	11
RCL 2	34 02
1	01
–	51
STO 2	33 02
EEX	43
2	02
x	71
RTN	24
LBL	23
E	15
f	31
TF 1	61
GTO	22
3	03
f	31

KEYS	CODE
INT	83
EEX	43
5	05
÷	81
g $x \rightleftarrows y$	35 07
5	05
+	61
g $x \rightleftarrows y$	35 07
GTO	22
4	04
LBL	23
3	03
f^{-1}	32
INT	83
LBL	23
4	04
STO	33
+	61
9	09
x	71
+	61
RCL 2	34 02
STO	33
÷	81
9	09
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 INV/2 CF MAX	R_4 $CF_8 \cdot CF_2$	R_7 $CF_{11} \cdot CF_5$
R_2 i/100, (1 + i/100)	R_5 $CF_9 \cdot CF_3$	R_8 $CF_{12} \cdot CF_6$
R_3 $CF_7 \cdot CF_1$	R_6 $CF_{10} \cdot CF_4$	R_9 f(i)

INTERNAL RATE OF RETURN UP TO 7 CASH FLOWS

KEYS	CODE
g R↑	35 09
0	00
STO	33
9	09
7	07
RCL 7	34 07
E	15
6	06
RCL 6	34 06
E	15
5	05
RCL 5	34 05
E	15
4	04
RCL 4	34 04
E	15
3	03
RCL 3	34 03
E	15
2	02
RCL 2	34 02
E	15
1	01
RCL 1	34 01
E	15
RCL	34
9	09
RCL 8	34 08
−	51
g x⇄y	35 07
÷	81
x	71
+	61
g LST X	35 00
g	35

KEYS	CODE
ABS	06
EEX	43
CHS	42
6	06
g x≤y	35 22
↑	41
GTO	22
0	00
g R↑	35 09
1	01
−	51
EEX	43
2	02
x	71
RTN	24
LBL	23
E	15
STO	33
+	61
9	09
x	71
+	61
g x⇄y	35 07
STO	33
÷	81
9	09
÷	81
RTN	24
LBL	23
A	11
f	31
REG	43
STO 1	33 01
RTN	24
LBL	23

KEYS	CODE
A	11
STO 2	33 02
RTN	24
LBL	23
A	11
STO 3	33 03
RTN	24
LBL	23
A	11
STO 4	33 04
RTN	24
LBL	23
A	11
STO 5	33 05
RTN	24
LBL	23
A	11
STO 6	33 06
RTN	24
LBL	23
A	11
STO 7	33 07
LBL	23
B	12
STO 8	33 08
RTN	24
LBL	23
C	13
1	01
g R↓	35 08

R_1 CF_1	R_4 CF_4	R_7 CF_7
R_2 CF_2	R_5 CF_5	R_8 INV
R_3 CF_3	R_6 CF_6	R_9 f(i)

DISCOUNTED CASH FLOW ANALYSIS
NET PRESENT VALUE

KEYS	CODE
LBL	23
A	11
CHS	42
STO 5	33 05
0	00
STO 7	33 07
1	01
STO 1	33 01
RCL 5	34 05
CHS	42
RTN	24
LBL	23
B	12
EEX	43
2	02
÷	81
STO 2	33 02
g LST X	35 00
x	71
RTN	24
LBL	23
C	13
STO 1	33 01
RTN	24
LBL	23
D	14
STO 3	33 03
1	01
RCL 2	34 02
+	61
RCL 1	34 01
STO	33
+	61
7	07
g	35

KEYS	CODE
y^x	05
STO 6	33 06
RCL 5	34 05
x	71
RCL 6	34 06
1	01
–	51
RCL 2	34 02
÷	81
RCL 3	34 03
x	71
+	61
STO 5	33 05
1	01
RCL 2	34 02
+	61
RCL 7	34 07
g	35
y^x	05
÷	81
1	01
STO 1	33 01
g R↓	35 08
RTN	24
LBL	23
E	15
RCL 7	34 07
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 #	R_4	R_7 Σn
R_2 i/100	R_5 NPV	R_8
R_3 CF	R_6 $(1+i)^n$	R_9

STRAIGHT LINE DEPRECIATION SCHEDULE

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 4	34 04
RCL 3	34 03
1	01
+	61
g x≤y	35 22
0	00
÷	81
RCL 3	34 03
RCL 4	34 04
g x>y	35 24
–	51
+	61
1	01
g LST X	35 00
f^{-1}	32
INT	83
+	61

KEYS	CODE
RCL 3	34 03
÷	81
RCL 1	34 01
RCL 2	34 02
–	51
x	71
RTN	24
LBL	23
E	15
0	00
STO 6	33 06
RCL 3	34 03
RCL 4	34 04
g x>y	35 24
0	00
RTN	24
–	51
RCL 3	34 03
÷	81
RCL 1	34 01
RCL 2	34 02
–	51
x	71
STO 6	33 06
RTN	24
LBL	23
E	15
RCL 6	34 06
RCL 2	34 02
+	61
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 2	34 02

KEYS	CODE
–	51
RCL 6	34 06
–	51
RTN	24
LBL	23
E	15
RCL 4	34 04
1	01
+	61
STO 4	33 04
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 SBV	R_4 YR	R_7
R_2 SAL	R_5	R_8
R_3 LIFE	R_6 Used	R_9 Used

SUM OF THE YEARS' DIGITS DEPRECIATION SCHEDULE

KEYS	CODE
STO 4	33 04
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
A	11
0	00
g x⇄y	35 07
g x≠y	35 21
STO 1	33 01
RTN	24
g R↓	35 08
g R↓	35 08
↑	41
f^{-1}	32
INT	83
↑	41
+	61
g x⇄y	35 07
f	31
INT	83
+	61
g LST X	35 00
1	01
+	61
x	71
2	02
÷	81
RTN	24

KEYS	CODE
LBL	23
E	15
RCL 1	34 01
RCL 2	34 02
–	51
STO 8	33 08
RCL 3	34 03
0	00
A	11
STO 7	33 07
RCL 4	34 04
RCL 3	34 03
1	01
+	61
g x≤y	35 22
0	00
÷	81
RCL 3	34 03
1	01
+	61
RCL 4	34 04
–	51
RCL 7	34 07
÷	81
RCL 8	34 08
x	71
RTN	24
LBL	23
E	15
RCL 3	34 03
RCL 4	34 04
–	51
0	00
g x>y	35 24
GTO	22

KEYS	CODE
1	01
A	11
RCL 7	34 07
÷	81
RCL 8	34 08
x	71
LBL	23
1	01
STO 5	33 05
RTN	24
LBL	23
E	15
RCL 8	34 08
RCL 5	34 05
–	51
STO 5	33 05
RCL 1	34 01
g x⇄y	35 07
–	51
RTN	24
LBL	23
E	15
RCL 5	34 05
RTN	24
LBL	23
E	15
RCL 4	34 04
1	01
+	61
g NOP	35 01

R_1 SBV	R_4 YR	R_7 SOD
R_2 SAL	R_5 RDV_k	R_8 SBV–SAL
R_3 LIFE	R_6	R_9 Used

VARIABLE RATE DECLINING BALANCE DEPRECIATION SCHEDULE

KEYS	CODE
STO 4	33 04
RTN	24
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
A	11
STO 2	33 02
RTN	24
LBL	23
B	12
STO 3	33 03
RTN	24
LBL	23
C	13
STO 5	33 05
RTN	24
LBL	23
E	15
RCL 4	34 04
RCL 3	34 03
1	01
+	61
g x≤y	35 22
0	00
÷	81
1	01
RCL 5	34 05
RCL 3	34 03
÷	81
STO 6	33 06
–	51
STO 7	33 07
RCL 4	34 04

KEYS	CODE
1	01
–	51
g	35
y^x	05
RCL 6	34 06
x	71
RCL 1	34 01
x	71
STO 8	33 08
RCL 6	34 06
RCL 1	34 01
x	71
1	01
RCL 7	34 07
RCL 4	34 04
g	35
y^x	05
–	51
x	71
1	01
RCL 7	34 07
–	51
÷	81
STO 7	33 07
RCL 1	34 01
RCL 2	34 02
–	51
g x>y	35 24
RCL 8	34 08
RTN	24
STO 7	33 07
–	51
RCL 8	34 08
–	51
CHS	42

KEYS	CODE
0	00
g x>y	35 24
RTN	24
g NOP	35 01
g x⇄y	35 07
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 2	34 02
–	51
RCL 7	34 07
–	51
RTN	24
LBL	23
E	15
RCL 1	34 01
RCL 7	34 07
–	51
RTN	24
LBL	23
E	15
RCL 7	34 07
RTN	24
LBL	23
E	15
RCL 4	34 04
1	01
+	61
g NOP	35 01

R_1 SBV	R_4 YR	R_7 TOT DEP
R_2 SAL	R_5 FACT	R_8 DEP_k
R_3 LIFE	R_6 FACT/LIFE	R_9 Used

CROSSOVER POINT—DECLINING BALANCE TO STRAIGHT LINE DEPRECIATION

KEYS	CODE
STO 1	33 01
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
STO 5	33 05
RTN	24
LBL	23
E	15
0	00
STO 4	33 04
1	01
RCL 5	34 05
RCL 3	34 03
÷	81
STO 7	33 07
—	51
STO 8	33 08
LBL	23
1	01
1	01
STO	33
+	61
4	04
RCL 4	34 04
RCL 3	34 03
1	01
+	61

KEYS	CODE
g x≤y	35 22
0	00
÷	81
RCL 8	34 08
RCL 4	34 04
1	01
—	51
g	35
y^x	05
1	01
—	51
1	01
RCL 8	34 08
—	51
÷	81
RCL 7	34 07
x	71
RCL 1	34 01
x	71
RCL 1	34 01
+	61
RCL 2	34 02
—	51
STO 6	33 06
RCL 3	34 03
RCL 4	34 04
—	51
1	01
+	61
÷	81
RCL 8	34 08
RCL 4	34 04
1	01
—	51
g	35

KEYS	CODE
y^x	05
RCL 7	34 07
x	71
RCL 1	34 01
x	71
—	51
0	00
g x>y	35 24
GTO	22
1	01
RCL 4	34 04
1	01
—	51
RTN	24
LBL	23
E	15
RCL 3	34 03
RCL 4	34 04
—	51
1	01
+	61
RTN	24
LBL	23
E	15
RCL 6	34 06
RCL 2	34 02
+	61
RTN	24
g NOP	35 01
g NOP	35 01

R_1 SBV	R_4 YEAR	R_7 FACT/LIFE
R_2 SAL	R_5 FACT	R_8 1 – FACT/LIFE
R_3 LIFE	R_6 BV	R_9 Used

DAYS BETWEEN DATES (ACTUAL)

KEYS	CODE
STO 8	33 08
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
RCL 8	34 08
D	14
STO 3	33 03
g LST X	35 00
STO 1	33 01
RCL 2	34 02
D	14
g LST X	35 00
STO	33
–	51
1	01
CLX	44
RCL 3	34 03
–	51
RCL 5	34 05
2	02
÷	81
STO	33
÷	81
1	01
g x⇄y	35 07
RTN	24
LBL	23
D	14
↑	41
f	31
INT	83

KEYS	CODE
STO 4	33 04
–	51
EEX	43
2	02
x	71
↑	41
f	31
INT	83
STO 6	33 06
–	51
EEX	43
4	04
x	71
STO 7	33 07
3	03
6	06
5	05
STO 5	33 05
x	71
2	02
RCL 4	34 04
g x>y	35 24
GTO	22
1	01
x	71
CLX	44
RCL 7	34 07
1	01
–	51
STO 7	33 07
GTO	22
2	02
LBL	23
1	01
•	83

KEYS	CODE
4	04
x	71
•	83
3	03
+	61
+	61
f	31
INT	83
–	51
RCL 7	34 07
LBL	23
2	02
CLX	44
RCL 6	34 06
+	61
RCL 4	34 04
1	01
–	51
3	03
1	01
x	71
+	61
RCL 7	34 07
4	04
÷	81
f	31
INT	83
g x⇄y	35 07
+	61
RTN	24

R_1 PER	R_4 M	R_7 Y, Z
R_2 DT2	R_5 365	R_8 DT1
R_3 Used	R_6 D	R_9 Used

DAYS BETWEEN DATES (30/360 BASIS)

KEYS	CODE
STO 8	33 08
RTN	24
LBL	23
B	12
STO 2	33 02
RTN	24
LBL	23
C	13
3	03
0	00
STO 3	33 03
RCL 8	34 08
D	14
STO 1	33 01
RCL 2	34 02
D	14
RCL 1	34 01
−	51
STO 1	33 01
RCL 5	34 05
CHS	42
2	02
÷	81
STO	33
÷	81
1	01
g R↓	35 08
RTN	24
LBL	23
D	14
↑	41
f	31
INT	83
STO 4	33 04
−	51

KEYS	CODE
EEX	43
2	02
x	71
↑	41
f	31
INT	83
STO 6	33 06
−	51
EEX	43
4	04
x	71
3	03
6	06
0	00
STO 5	33 05
x	71
RCL 4	34 04
3	03
0	00
x	71
+	61
RCL 6	34 06
3	03
1	01
g x=y	35 23
GTO	22
1	01
g R↓	35 08
STO 3	33 03
+	61
RTN	24
LBL	23
1	01
g R↓	35 08
g R↓	35 08

KEYS	CODE
RCL 3	34 03
3	03
0	00
g x=y	35 23
GTO	22
2	02
g R↓	35 08
CLX	44
RCL 6	34 06
STO 3	33 03
+	61
RTN	24
LBL	23
2	02
g R↓	35 08
STO 3	33 03
+	61
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 PER	R_4 M	R_7
R_2 DT2	R_5 360	R_8 DT1
R_3 Used	R_6 D	R_9 Used

BOND PRICE

KEYS	CODE
LBL	23
A	11
CHS	42
STO 1	33 01
CHS	42
RTN	24
LBL	23
B	12
EEX	43
2	02
STO 3	33 03
g R↓	35 08
STO 4	33 04
RTN	24
LBL	23
C	13
STO 2	33 02
RTN	24
LBL	23
D	14
STO 3	33 03
RTN	24
LBL	23
E	15
RCL 2	34 02
2	02
0	00
0	00
÷	81
1	01
+	61
STO 7	33 07
1	01
RCL 1	34 01
f^{-1}	32

KEYS	CODE
INT	83
+	61
STO 6	33 06
RCL 1	34 01
CHS	42
1	01
g x>y	35 24
GTO	22
1	01
RCL 7	34 07
RCL 6	34 06
g	35
y^x	05
RCL 7	34 07
RCL 1	34 01
g	35
y^x	05
STO 7	33 07
−	51
RCL 4	34 04
x	71
RCL 2	34 02
÷	81
EEX	43
2	02
x	71
RCL 6	34 06
2	02
÷	81
RCL 4	34 04
x	71
STO 5	33 05
−	51
RCL 7	34 07
RCL 3	34 03

KEYS	CODE
x	71
+	61
RTN	24
LBL	23
1	01
RCL 4	34 04
2	02
÷	81
RCL 3	34 03
+	61
RCL 7	34 07
1	01
−	51
RCL 1	34 01
x	71
CHS	42
1	01
+	61
÷	81
RCL 4	34 04
2	02
÷	81
RCL 6	34 06
x	71
STO 5	33 05
−	51
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 −PER	R_4 CR	R_7 Used
R_2 YLD	R_5 ACC INT	R_8 DT1
R_3 RV	R_6 J	R_9 Used

BOND YIELD
(1 OR MORE REMAINING COUPON PERIODS)

KEYS	CODE
CHS	42
STO 1	33 01
CHS	42
RTN	24
LBL	23
B	12
EEX	43
2	02
STO 3	33 03
g R↓	35 08
STO 4	33 04
RTN	24
LBL	23
C	13
STO 5	33 05
RTN	24
LBL	23
D	14
STO 3	33 03
RTN	24
LBL	23
E	15
A	11
RCL 1	34 01
f	31
INT	83
÷	81
RCL 4	34 04
2	02
÷	81
RCL 5	34 05
÷	81
STO 7	33 07
LBL	23
1	01

KEYS	CODE
1	01
RCL 3	34 03
RCL 5	34 05
÷	81
1	01
RCL 7	34 07
+	61
RCL 1	34 01
g	35
y^x	05
STO 6	33 06
x	71
–	51
RCL 7	34 07
x	71
1	01
RCL 6	34 06
–	51
÷	81
RCL 4	34 04
2	02
÷	81
RCL 5	34 05
÷	81
–	51
STO	33
–	51
7	07
g	35
ABS	06
EEX	43
CHS	42
6	06
g x≤y	35 22
GTO	22

KEYS	CODE
1	01
RCL 7	34 07
2	02
0	00
0	00
x	71
STO 2	33 02
RTN	24
RCL 5	34 05
1	01
RCL 1	34 01
f^{-1}	32
INT	83
+	61
g LST X	35 00
x	71
4	04
÷	81
RCL 4	34 04
x	71
RCL 7	34 07
x	71
–	51
STO 5	33 05
GTO	22
1	01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 -PER	R_4 CR	R_7 Used
R_2 YLD	R_5 PRICE, Used	R_8 DT1
R_3 RV	R_6 Used	R_9 Used

BOND YIELD (LESS THAN ONE REMAINING COUPON PERIOD)

KEYS	CODE
LBL	23
A	11
CHS	42
STO 1	33 01
CHS	42
RTN	24
LBL	23
B	12
EEX	43
2	02
STO 3	33 03
g R↓	35 08
STO 4	33 04
RTN	24
LBL	23
C	13
STO 5	33 05
RTN	24
LBL	23
D	14
STO 3	33 03
RTN	24
LBL	23
E	15
1	01
RCL 1	34 01
g	35
ABS	06
g x>y	35 24
0	00
÷	81
RCL 4	34 04
2	02
0	00
0	00

KEYS	CODE
+	61
1	01
RCL 1	34 01
+	61
2	02
÷	81
RCL 4	34 04
x	71
RCL 5	34 05
+	61
÷	81
2	02
−	51
RCL 3	34 03
x	71
RCL 1	34 01
CHS	42
÷	81
STO 2	33 02
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 PER	R_4 CR	R_7
R_2 YLD	R_5 PRICE	R_8
R_3 RV	R_6	R_9 Used

ACCRUED SIMPLE INTEREST

KEYS	CODE
LBL	23
A	11
STO 1	33 01
RTN	24
LBL	23
B	12
↑	41
↑	41
EEX	43
2	02
÷	81
STO 2	33 02
g x⇄y	35 07
RTN	24
LBL	23
C	13
STO 3	33 03
RTN	24
LBL	23
D	14
RCL 3	34 03
RCL 3	34 03
RCL 2	34 02
x	71
RCL 1	34 01
x	71
3	03
6	06
0	00
÷	81
RTN	24
LBL	23
E	15
RCL 3	34 03
RCL 3	34 03

KEYS	CODE
RCL 2	34 02
x	71
RCL 1	34 01
x	71
3	03
6	06
5	05
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 DAYS	R_4	R_7
R_2 RATE/100	R_5	R_8
R_3 BEG AMT	R_6	R_9

LINEAR REGRESSION (TREND LINE)

KEYS	CODE	KEYS	CODE	KEYS	CODE
f	31	RCL 2	34 02	x	71
REG	43	RTN	24	RCL 5	34 05
RTN	24	LBL	23	RCL 8	34 08
LBL	23	D	14	CHS	42
B	12	RCL 7	34 07	÷	81
STO 1	33 01	RCL 3	34 03	+	61
g	35	RCL 5	34 05	STO 2	33 02
DSZ	83	x	71	RTN	24
STO	33	RCL 8	34 08	LBL	23
+	61	÷	81	D	14
3	03	+	61	CLX	44
↑	41	↑	41	RCL 1	34 01
x	71	↑	41	RTN	24
STO	33	RCL 3	34 03	LBL	23
+	61	↑	41	D	14
4	04	x	71	g R↑	35 09
RCL 1	34 01	RCL 8	34 08	RTN	24
RTN	24	÷	81	LBL	23
LBL	23	RCL 4	34 04	E	15
C	13	+	61	RCL 1	34 01
STO 2	33 02	÷	81	x	71
STO	33	STO 1	33 01	RCL 2	34 02
+	61	x	71	+	61
5	05	RCL 5	34 05	RTN	24
↑	41	↑	41	g NOP	35 01
x	71	x	71	g NOP	35 01
STO	33	RCL 8	34 08	g NOP	35 01
+	61	÷	81	g NOP	35 01
6	06	RCL 6	34 06	g NOP	35 01
g LST X	35 00	+	61	g NOP	35 01
RCL 1	34 01	÷	81		
x	71	RCL 3	34 03		
STO	33	RCL 8	34 08		
+	61	÷	81		
7	07	RCL 1	34 01		

R_1 x, m	R_4 Σx^2	R_7 Σxy
R_2 y, b	R_5 Σy	R_8 −n
R_3 Σx	R_6 Σy^2	R_9

EXPONENTIAL CURVE FIT (GROWTH CURVE)

KEYS	CODE
f	31
REG	43
RTN	24
LBL	23
B	12
STO 1	33 01
g	35
DSZ	83
STO	33
+	61
3	03
↑	41
x	71
STO	33
+	61
4	04
RCL 1	34 01
RTN	24
LBL	23
C	13
STO 2	33 02
f	31
LN	07
STO	33
+	61
5	05
↑	41
x	71
STO	33
+	61
6	06
g LST X	35 00
RCL 1	34 01
x	71
STO	33

KEYS	CODE
+	61
7	07
RCL 2	34 02
RTN	24
LBL	23
D	14
RCL 7	34 07
RCL 3	34 03
RCL 5	34 05
x	71
RCL 8	34 08
÷	81
+	61
↑	41
↑	41
RCL 3	34 03
↑	41
x	71
RCL 8	34 08
÷	81
RCL 4	34 04
+	61
÷	81
STO 1	33 01
x	71
RCL 5	34 05
↑	41
x	71
RCL 8	34 08
÷	81
RCL 6	34 06
+	61
÷	81
RCL 3	34 03
RCL 8	34 08

KEYS	CODE
÷	81
RCL 1	34 01
x	71
RCL 5	34 05
RCL 8	34 08
CHS	42
÷	81
+	61
f^{-1}	32
LN	07
STO 2	33 02
RTN	24
LBL	23
D	14
CLX	44
RCL 1	34 01
RTN	24
LBL	23
D	14
g R↑	35 09
RTN	24
LBL	23
E	15
RCL 1	34 01
x	71
f^{-1}	32
LN	07
RCL 2	34 02
x	71
RTN	24

R_1 x, m	R_4 Σx^2	R_7 $\Sigma x \ln y$
R_2 y, b	R_5 $\Sigma \ln y$	R_8 −n
R_3 Σx	R_6 $\Sigma(\ln y)^2$	R_9

TOTAL, AVERAGE, AND PERCENT OF TOTAL (UP TO 8 ITEMS)

KEYS	CODE
f	31
REG	43
9	09
STO 8	33 08
CLX	44
RTN	24
LBL	23
D	14
C	13
9	09
RCL 8	34 08
−	51
÷	81
RTN	24
LBL	23
B	12
RCL 1	34 01
g x⇄y	35 07
STO 1	33 01
g x⇄y	35 07
RCL 2	34 02
g x⇄y	35 07
STO 2	33 02
g x⇄y	35 07
RCL 3	34 03
g x⇄y	35 07
STO 3	33 03
g x⇄y	35 07
RCL 4	34 04
g x⇄y	35 07
STO 4	33 04
g x⇄y	35 07
RCL 5	34 05
g x⇄y	35 07
STO 5	33 05

KEYS	CODE
g x⇄y	35 07
RCL 6	34 06
g x⇄y	35 07
STO 6	33 06
g x⇄y	35 07
RCL 7	34 07
STO	33
9	09
g x⇄y	35 07
STO 7	33 07
1	01
0	00
RCL 8	34 08
−	51
g	35
DSZ	83
RTN	24
g NOP	35 01
0	00
STO 8	33 08
RTN	24
LBL	23
C	13
RCL 1	34 01
RCL 2	34 02
+	61
RCL 3	34 03
+	61
RCL 4	34 04
+	61
RCL 5	34 05
+	61
RCL 6	34 06
+	61
RCL 7	34 07

KEYS	CODE
+	61
RCL	34
9	09
+	61
RTN	24
LBL	23
E	15
RCL	34
9	09
B	12
1	01
STO	33
+	61
8	08
g	35
DSZ	83
GTO	22
E	15
1	01
STO 8	33 08
RCL 1	34 01
RCL 1	34 01
C	13
÷	81
EEX	43
2	02
x	71
RTN	24
g NOP	35 01
g NOP	35 01

R_1 x	R_4 x	R_7 x
R_2 x	R_5 x	R_8 Used
R_3 x	R_6 x	R_9 x

MOVING AVERAGES

KEYS	CODE
LBL	23
B	12
RCL 1	34 01
g x⇄y	35 07
STO 1	33 01
g x⇄y	35 07
RCL 2	34 02
g x⇄y	35 07
STO 2	33 02
g x⇄y	35 07
RCL 3	34 03
g x⇄y	35 07
STO 3	33 03
g x⇄y	35 07
RCL 4	34 04
g x⇄y	35 07
STO 4	33 04
g x⇄y	35 07
RCL 5	34 05
g x⇄y	35 07
STO 5	33 05
g x⇄y	35 07
STO 6	33 06
g	35
DSZ	83
RCL 8	34 08
CHS	42
RTN	24
LBL	23
A	11
f	31
REG	43
STO 7	33 07
RTN	24
LBL	23

KEYS	CODE
C	13
RCL 7	34 07
6	06
g x=y	35 23
GTO	22
1	01
CLX	44
STO 6	33 06
CLX	44
5	05
g x=y	35 23
GTO	22
1	01
CLX	44
STO 5	33 05
CLX	44
4	04
g x=y	35 23
GTO	22
1	01
CLX	44
STO 4	33 04
CLX	44
3	03
g x=y	35 23
GTO	22
1	01
CLX	44
STO 3	33 03
CLX	44
2	02
g x=y	35 23
GTO	22
1	01
0	00

KEYS	CODE
÷	81
LBL	23
1	01
RCL 1	34 01
RCL 2	34 02
+	61
RCL 3	34 03
+	61
RCL 4	34 04
+	61
RCL 5	34 05
+	61
RCL 6	34 06
+	61
RCL 7	34 07
÷	81
RTN	24
LBL	23
D	14
LBL	23
E	15
0	00
÷	81
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 x_k	R_4 x_{k-3}	R_7 #
R_2 x_{k-1}	R_5 x_{k-4}	R_8 $-k$
R_3 x_{k-2}	R_6 x_{k-5}	R_9 Used

INVOICING

KEYS	CODE
LBL	23
A	11
CLX	44
STO 1	33 01
STO 2	33 02
STO 3	33 03
STO 4	33 04
STO 5	33 05
RTN	24
LBL	23
B	12
STO 1	33 01
RTN	24
LBL	23
C	13
STO 2	33 02
RTN	24
LBL	23
D	14
STO 3	33 03
RTN	24
LBL	23
E	15
RCL 2	34 02
RCL 3	34 03
x	71
↑	41
↑	41
RCL 1	34 01
EEX	43
2	02
÷	81
x	71
–	51
STO	33

KEYS	CODE
+	61
4	04
STO	33
+	61
5	05
RTN	24
LBL	23
E	15
RCL 4	34 04
RTN	24
LBL	23
E	15
CLX	44
STO 4	33 04
RTN	24
LBL	23
E	15
RCL 5	34 05
RTN	24
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

KEYS	CODE
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01
g NOP	35 01

R_1 DISC	R_4 SUB-TOT	R_7
R_2 #	R_5 GRAND TOTAL	R_8
R_3 PRICE	R_6	R_9

HEWLETT hp PACKARD

Sales and service from 172 offices in 65 countries.
19310 Pruneridge Avenue, Cupertino, California 95014

00065-90256 Rev. B 1/75

Scan Copyright ©
The Museum of HP Calculators
www.hpmuseum.org

Original content used with permission.

Thank you for supporting the Museum of HP Calculators by purchasing this Scan!

Please to not make copies of this scan or make it available on file sharing services.