

Program Title MULTIPLE LINEAR REGRESSIONContributor's Name NAMIR C. SHAMMAS

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Program Description, Equations, Variables

This program helps the user to input up to 9 independent variables involved in a multiple linear regression and carry out the proper summations and locate them in the registers that are used by the Math 1 module subroutine PVT to solve for the coefficients $a_0, a_1, \dots, a_n$ ($n \leq 9$) in

$$y = a_0 + a_1 x_1 + a_2 x_2 + \dots + a_n x_n$$

Projection of the x 's on y is also available. Inserting a LN instruction after lines 22, 37, 129 and and ETX instruction after line 152, transform the program into one that does empirical regression

$$\ln y = a_0 + a_1 \ln x_1 + a_2 \ln x_2 + \dots + a_n \ln x_n$$

Necessary Accessories CARD READER, MATH1 and MEMORY MODULESOperating Limits and Warnings number of data points $\geq n+1$

Reference(s) _____

This program has been verified only with respect to the numerical example given in Program Description II. User accepts and uses this program material AT HIS OWN RISK, in reliance solely upon his own inspection of the program material and without reliance upon any representation or description concerning the program material.

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Sample Problem (Sketch if Desired)

Using the data to the right
find the coeff. in

$$\hat{y} = a_0 + a_1x_1 + a_2x_2 + a_3x_3$$

Then calculate $\hat{y}$ for
 $x_1 = x_2 = x_3 = 1.0$

x_1	x_2	x_3	y
1	2	3	5
1	-1	2	3
2	1	1/2	8
3	2	1	10

SOLUTION:

Input	Function	Display	Comments
		Y?	
		10.00000	RUN
		X1?	
		3	RUN
	XEQ "SM"	X2?	
N?		2	RUN
	3.00000	X3?	
Y?		1	RUN
	5.00000	Y?	
X1?			RUN
	1		
X2?		X1.=4.50000	
	2	X2.=1.50000	
X3?		X3.=1.00000	
	3	X4.=-1.00000	
Y?			
	3.00000		XEQ "PM"
X1?		X3?	
	1	1	RUN
X2?		X2?	
	-1	1	RUN
X3?		X1?	
	2	1	RUN
Y?		Y=6.00000	
	8.00000		
X1?			
	2		
X2?			
	1		
X3?			
	.5		

				SIZE: YOUR CHOICE (HP-41C)
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Load Program (3 tracks)			
2	Verify that enough memories are available			
3	Start program running		XEQ ΣM	N?
4	Input number of independent variables	n	R/S	Y?
5	Input $y, x_1, x_2, \dots, x_n$. Repeat step 5 until all data sets are entered. Afterwards respond to the Y? prompt by pressing "run" only.	y	R/S	X1?
		x_1	R/S	X2?
		x_2	R/S	:
		:	:	Xn?
		x_n	R/S	Y?
			R/S	X1. = (a_0)
			R/S*	X2. = (a_1)
			:	:
			R/S*	Xn+1 = (a_n)
6	(Optional) While still in the data input prompts, a data set may be deleted simply by setting flag 01 and proceeding as in step 5.		SF 01	
7	(Optional) to calculate $\hat{y}$	x_n	XEQ $\Sigma M \hat{E}$	Xn?
		:	R/S	:
		:	:	X2?
		x_2	R/S	X1?
		x_1	R/S	$Y = (\hat{y})$

*Omitt if printer is ON.

□ 67 □ 97 □ 41C

STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL "ΣM"		INITL.	47	15		
02	SF 21			48	STO 12		
03	CF 04			49	RCL 15		
04	CF 03			50	1		
05	CLRG		PROMPT	51	+		
06	"N?"		FOR n	52	CF 21		VIEW # OF
07	PROMPT			53	VIEW X		DATA
08	1			54	SF 21		
09	+			55	LBL 04		OUTER LOOP
10	STO 14			56	RCL 11		FOR SUMMATION
11	DSE X			57	FRC		
12	1 E3			58	STO 11		
13	/			59	LBL 02		INNER LOOP
14	STO 13			60	RCL IND		FOR SUMMATION
15	LBL 00			13			
16	CF 01			61	RCL IND		
17	CF 22		INPUT Y	11			$\rightarrow \Sigma X_i X_j$
18	"Y?"			62	*		
19	BEEP			63	FC? 01		Σ - IF FLAG1
20	PROMPT			64	ST+ IND		IS SET
21	FC? 22			12			
22	GTO 03			65	FS? 01		
23	STO 10			66	ST- IND		
24	RCL 13			12			
25	FRC		RESET	67	ISG 12		
26	STO 13		COUNTERS	68	DEG		
27	1		FOR X_i	69	ISG 11		
28	STO 00			70	GTO 02		
29	ISG 13			71	RCL 14		
30	LBL 01		LOOP TO	72	X↑2		CALC. LOCATION
31	FIX 0		INPUT X_1 ,	73	LASTX		TO STORE SOL.
32	CF 29		$X_2, \dots, X_n$	74	+		VECTOR
33	"X"			75	15		
34	ARCL 13			76	+		
35	"I?"			77	RCL 13		
36	TONE IND			78	+		
13				79	RCL IND		$\rightarrow \Sigma Y X_i$
37	PROMPT			13			
38	STO IND			80	RCL 10		
13				81	*		Σ - IF FLAG1
39	ISG 13			82	FC? 01		IS SET.
40	GTO 01			83	ST+ IND		
41	FIX 5			Y			
42	SF 29		RESET	84	FS? 01		
43	RCL 13		COUNTERS	85	ST- IND		
44	FRC			Y			
45	STO 13			86	ISG 13		
46	STO 11			87	GTO 04		

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REGISTERS, STATUS, FLAGS, ASSIGNMENTS

[illegible]

PROGRAM REGISTERS NEEDED: 37

ROW 1 (1 : 5)



ROW 2 (6 : 13)



ROW 3 (14 : 21)



ROW 4 (22 : 31)



ROW 5 (32 : 38)



ROW 6 (38 : 46)



ROW 7 (47 : 55)



ROW 8 (56 : 64)



ROW 9 (65 : 72)



ROW 10 (73 : 82)



ROW 11 (83 : 89)



ROW 12 (90 : 96)



ROW 13 (96 : 105)



ROW 14 (105 : 114)



ROW 15 (115 : 120)



ROW 16 (121 : 128)



ROW 17 (128 : 135)



ROW 18 (136 : 145)



ROW 19 (146 : 153)



ROW 20 (153 : 156)

