

00397C PROGRAM DESCRIPTION I

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Program Title PILOTED LINEAR REGRESSION

Contributor's Name NAMIR C. SHAMMAS

Address _____

City _____ State _____ Zip Code _____

Program Description, Equations, Variables

The two-program package allows the user to fit his (x,y) data in up to 9 different equations, with one data entry. The selection of the type of curves is done by storing a "CODE" made up of the equation indices (see instructions). In each program there is a "pilot routine" that strictly follows your selection as expressed by the code you stored. In addition to calculate the r^2 , slopes & intercepts, we can calculate $\hat{y}$ and $\hat{x}$ for the curve we specify. For each block of stat. registers the transformed data (X,Y) are used to calc. r^2 , a, b, by:

$$b = [\sum XY - n \bar{X} \bar{Y}] / [\sum X^2 (n-1)]$$

$$r^2 = (b S_x / S_y)^2$$

$$a = \bar{Y} - b \bar{X}$$

Necessary Accessories CARD READER, 3 MEMORY MODULES.

Operating Limits and Warnings AVOID SELECTING CURVES THAT WILL PRODUCE ERROR WITH DATA, AS IN NEGATIVE NUMBERS AND LOGARITHMS OR SQUARE ROOTS.

Reference(s) ANY STATISTICS TEXTBOOK. NOTE: FOR A BETTER UNDERSTANDING OF THE "PILOT ROUTINE" CONCEPT, IN GENERAL, SEND A SELF ADDRESSED STAMPED ENVELOPE TO PROGRAM AUTHOR.

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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00397 PROGRAM DESCRIPTION II

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Sample Problem (Sketch if Desired)

The table to the right shows temp. in °F and their equivalent values in °C. Using this table;

- (1) Fit a straight line, logarithmic, power and square root. Obtain the results.
- (2) Delete the last point (35,95)
- (3) Calculate results for r^2 , a, b.
- (4) Using the straight line fit project $x = 10$ on y (i.e. calc. $\hat{y}$).

$T^{\circ}F(Y)$	$T^{\circ}C(X)$
212	100
77	25
86	30
95	35

CODE = 1 2 4 6 = 1246
 ↑ ↑ ↑ ↑
 LINEAR LOG POWER SQUARE
 ROOT

SOLUTION:

Input	XEQ "ΣΣ"	Display	X↑Y?	XEQ "XY"
CODE?				SF 01
1,246.00000 RUN				35.00000 ENTER↑
X↑Y?				95.00000 RUN
100.00000 ENTER↑			X↑Y?	XEQ "ab"
212.00000 RUN				CURVE : 6
X↑Y?				R2=0.99928
25.00000 ENTER↑				a=-61.64343
77.00000 RUN				b=27.34405
X↑Y?				CURVE : 4
30.00000 ENTER↑				R2=0.99953
86.00000 RUN				a=7.09372
X↑Y?				b=0.73737
35.00000 ENTER↑				CURVE : 2
95.00000 RUN				R2=0.99620
X↑Y?				a=-249.20066
XEQ "ab"				b=100.00905
CURVE : 6				CURVE : 1
R2=0.99775				R2=1.00000
a=-64.38104				a=32.00000
b=27.56472				b=1.00000
CURVE : 4				XEQ "Y"
R2=0.99871				X?
a=6.96222				10.00000 RUN
b=0.74061				CRV?
CURVE : 2				1.00000 RUN
R2=0.98050				Y.=50.00000
a=-257.10240				
b=101.37604				
CURVE : 1				
R2=1.00000				
a=32.00000				
b=1.00000				

USER INSTRUCTIONS

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				SIZE: 100
STEP	INSTRUCTIONS	INPUT	FUNCTION	DISPLAY
1	Set USER mode (optional)			
2	Load program $\Sigma\Sigma+$			
3	Go to END		GTO $\square\square$	
4	Load program $>Y$			
5	Start		XEQ $\Sigma\Sigma+$	CODE?
6	Build your code using 1 to 9 curve indices as shown below:			
	<u>Index</u> <u>Curve</u>			
	1 $y = a + bx$			
	2 $y = a + b \ln x$			
	3 $y = a e^{bx}$			
	4 $y = a x^b$			
	5 $y = a + bx^2$			
	6 $y = a + b\sqrt{x}$			
	7 $y = a + \frac{b}{x}$			
	8 $1/y = a + b/x$			
	9 $\ln y = a + b/x$			
	(1 digit $\leq$ CODE $\leq$ 9 digits)	CODE	R/S	X $\uparrow$ Y?
7	Enter data	x	ENTER $\uparrow$	
	(To delete data, set flag $\phi 1$, then cancel it once you are through. If you wish to delete the last pair entered use $R_{02} = x$, $R_{03} = y$)	y	R/S	X $\uparrow$ Y?
8	To obtain slopes and intercepts. Each curve no. will be displayed along the		XEQ τab R/S** R/S**	CURVE: no. $R2 = (r^2)$ $a = (a)$

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL ">Y"		→ $\hat{Y}$ ROUTINE	47	ARCL X		
02	SF 00			48	AVIEW		
03	CF 01			49	CF 12		
04	"X?"			50	FIX 5		
05	PROMPT			51	STO 05		
06	STO 02			52	CHS		
07	"CRV?"			53	8		
08	PROMPT			54	*		RELOCATE PROPER
09	SF 29			55	102		STAT BLOCK ---
10	GTO IND			56	+		
X				57	SREG IND		
11	LBL ">X"		→ $\hat{X}$ ROUTINE	X			
12	SF 01			58	4		
13	CF 00			59	+		
14	SF 29			60	STO 04		START CALC. (b)
15	"Y?"			61	RCL IND		
16	PROMPT			04			
17	STO 03			62	STO Y		
18	"CRV?"			63	ISG 04		
19	PROMPT			64	STO X		
20	GTO IND			65	RCL IND		
X				04			
21	LBL "ab"		LINEAR REGRS.	66	MEAN		
22	CF 29		ROUTINE	67	LASTX		
23	SF 21			68	*		
24	CF 01			69	*		
25	CF 00			70	-		
26	RCL 00		TEST IF CODE	71	RCL IND		
27	1		NEEDS RESETTING	04			
28	X<=Y?			72	1		
29	GTO 10			73	-		
30	LBL 11		RESET CODE	74	/		
31	RCL 01			75	7		
32	10↑X			76	ST- 04		
33	ST* 00			77	RDN		
34	LBL 10		"PILOT ROUTINE"	78	STO IND		
35	RCL 00			04			
36	INT			79	SDEV		
37	X=0?			80	X↑2		
38	GTO 17			81	ST/ IND		
39	10			04			
40	ST/ 00			82	SQRT		
41	MOD			83	X<>Y		
42	ADV			84	/		
43	SF 12			85	RCL IND		
44	FIX 0			04			
45	TONE IND			86	*		CALC. Y ²
05			DISPLAY CURVE	87	X↑2		
46	"CURVE :		NUMBER	88	STO 06		
"				89	MEAN		
				90	RCL IND		
				04			

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
91	*		CALC. (A)	139	LBL 22		} $\rightarrow \hat{y}$
92	-			140	RCL 02		
93	ISG 04			141	LN		
94	STO X			142	RCL 84		
95	STO IND			143	*		} $\rightarrow \hat{x}$
04				144	RCL 85		
96	"R2="		DISPLAY T^2	145	+		
97	ARCL 06			146	GTO 18		
98	AVIEW			147	LBL 32		} $\rightarrow \hat{x}$
99	RCL 05			148	RCL 03		
100	GTO IND			149	RCL 85		
X				150	-		
101	LBL 01		LINEAR FIT	151	RCL 84		} $\rightarrow \hat{x}$
102	FS? 00			152	/		
103	GTO 21			153	E↑X		
104	FS? 01			154	GTO 19		
105	GTO 31		} DISPLAY INTERCEPT & SLOPE	155	LBL 03		EXPONENTIAL FIT
106	"a="			156	FS? 00		
107	ARCL 93			157	GTO 23		
108	AVIEW			158	FS? 01		
109	"b="		} $\rightarrow \hat{y}$	159	GTO 33		} ADJUST (a) AND DISPLAY (a) & (b)
110	ARCL 92			160	RCL 77		
111	AVIEW			161	E↑X		
112	GTO 10			162	STO 77		
113	LBL 21		} $\rightarrow \hat{x}$	163	"a="		} $\rightarrow \hat{y}$
114	RCL 02			164	ARCL X		
115	RCL 92			165	AVIEW		
116	*			166	"b="		
117	RCL 93		} $\rightarrow \hat{x}$	167	ARCL 76		} $\rightarrow \hat{y}$
118	+			168	AVIEW		
119	GTO 18			169	GTO 10		
120	LBL 31			170	LBL 23		} $\rightarrow \hat{y}$
121	RCL 03		} $\rightarrow \hat{x}$	171	RCL 02		
122	RCL 93			172	RCL 76		
123	-			173	*		
124	RCL 92		LOG FIT	174	E↑X		} $\rightarrow \hat{x}$
125	/			175	RCL 77		
126	GTO 19			176	*		
127	LBL 02			177	GTO 18		} $\rightarrow \hat{x}$
128	FS? 00		} DISPLAY a & b	178	LBL 33		
129	GTO 22			179	RCL 03		
130	FS? 01			180	RCL 77		
131	GTO 32		} $\rightarrow \hat{x}$	181	/		POWER FIT
132	"a="			182	LN		
133	ARCL 85			183	RCL 76		
134	AVIEW			184	/		
135	"b="		} $\rightarrow \hat{x}$	185	GTO 19		POWER FIT
136	ARCL 84			186	LBL 04		
137	AVIEW			187	FS? 00		
138	GTO 10			188	GTO 24		

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
189	FS?	01	} ADJUST "a" AND DISPLAY (a) & (b)	240	RCL	60	} $y = a + b\sqrt{x}$ FIT
190	GTO	34		241	/		
191	RCL	69		242	SQRT		
192	ETX			243	GTO	19	
193	STO	69		244	LBL	06	
194	"a="			245	FS?	00	
195	ARCL	X		246	GTO	26	
196	AVIEW			247	FS?	01	
197	"b="			248	GTO	36	
198	ARCL	68		249	"a="		
199	AVIEW		} → $\hat{y}$	250	ARCL	53	} DISPLAY (a) & (b)
200	GTO	10		251	AVIEW		
201	LBL	24		252	"b="		
202	RCL	02		253	ARCL	52	
203	RCL	68		254	AVIEW		
204	Y↑X			255	GTO	10	
205	RCL	69		256	LBL	26	
206	*			257	RCL	02	
207	GTO	18		258	SQRT		
208	LBL	34		259	RCL	52	
209	RCL	03	} → $\hat{x}$	260	*		} → $\hat{y}$
210	RCL	69		261	RCL	53	
211	/			262	+		
212	RCL	68		263	GTO	18	
213	1/X			264	LBL	36	
214	Y↑X			265	RCL	03	
215	GTO	19		266	RCL	53	
216	LBL	05		267	-		
217	FS?	00		268	RCL	52	
218	GTO	25		269	/		
219	FS?	01	} $y = a + bx^2$ FIT	270	X↑2		} → $\hat{x}$
220	GTO	35		271	GTO	19	
221	"a="			272	LBL	07	
222	ARCL	61		273	FS?	00	
223	AVIEW			274	GTO	27	
224	"b="			275	FS?	01	
225	ARCL	60		276	GTO	37	
226	AVIEW			277	"a="		
227	GTO	10		278	ARCL	45	
228	LBL	25		279	AVIEW		
229	RCL	02	} DISPLAY (a) & (b)	280	"b="		} DISPLAY (a) & (b)
230	X↑2			281	ARCL	44	
231	RCL	60		282	AVIEW		
232	*			283	GTO	10	
233	RCL	61		284	LBL	27	
234	+			285	RCL	02	
235	GTO	18		286	1/X		
236	LBL	35		287	RCL	44	
237	RCL	03		288	*		
238	RCL	61		289	RCL	45	
239	-		} → $\hat{y}$				} → $\hat{y}$

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STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
290	+			341	GTO 10		
291	GTO 18			342	♦LBL 29		
292	♦LBL 37			343	RCL 02		
293	RCL 03			344	1/X		
294	RCL 45			345	RCL 28		
295	-			346	*		
296	RCL 44			347	RCL 29		
297	/			348	+		
298	1/X			349	E↑X		
299	GTO 19			350	GTO 18		
300	♦LBL 08			351	♦LBL 39		
301	FS? 00			352	RCL 03		
302	GTO 28			353	LN		
303	FS? 01			354	RCL 29		
304	GTO 38			355	-		
305	"a="			356	RCL 28		
306	ARCL 37			357	/		
307	AVIEW			358	1/X		
308	"b="			359	GTO 19		
309	ARCL 36			360	♦LBL 18		
310	AVIEW			361	"Y.="		
311	GTO 10			362	ARCL X		
312	♦LBL 28			363	AVIEW		
313	RCL 02			364	RTN		
314	1/X			365	♦LBL 19		
315	RCL 36			366	"X.="		
316	*			367	ARCL X		
317	RCL 37			368	AVIEW		
318	+			369	RTN		
319	1/X			370	♦LBL 00		
320	GTO 18			371	"NOP"		
321	♦LBL 38			372	AVIEW		
322	RCL 03			373	RTN		
323	1/X			374	♦LBL 17		
324	RCL 37			375	BEEP		
325	-			376	END		
326	RCL 36						
327	/						
328	1/X						
329	GTO 19						
330	♦LBL 09						
331	FS? 00						
332	GTO 29						
333	FS? 01						
334	GTO 39						
335	"a="						
336	ARCL 29						
337	AVIEW						
338	"b="						
339	ARCL 28						
340	AVIEW						

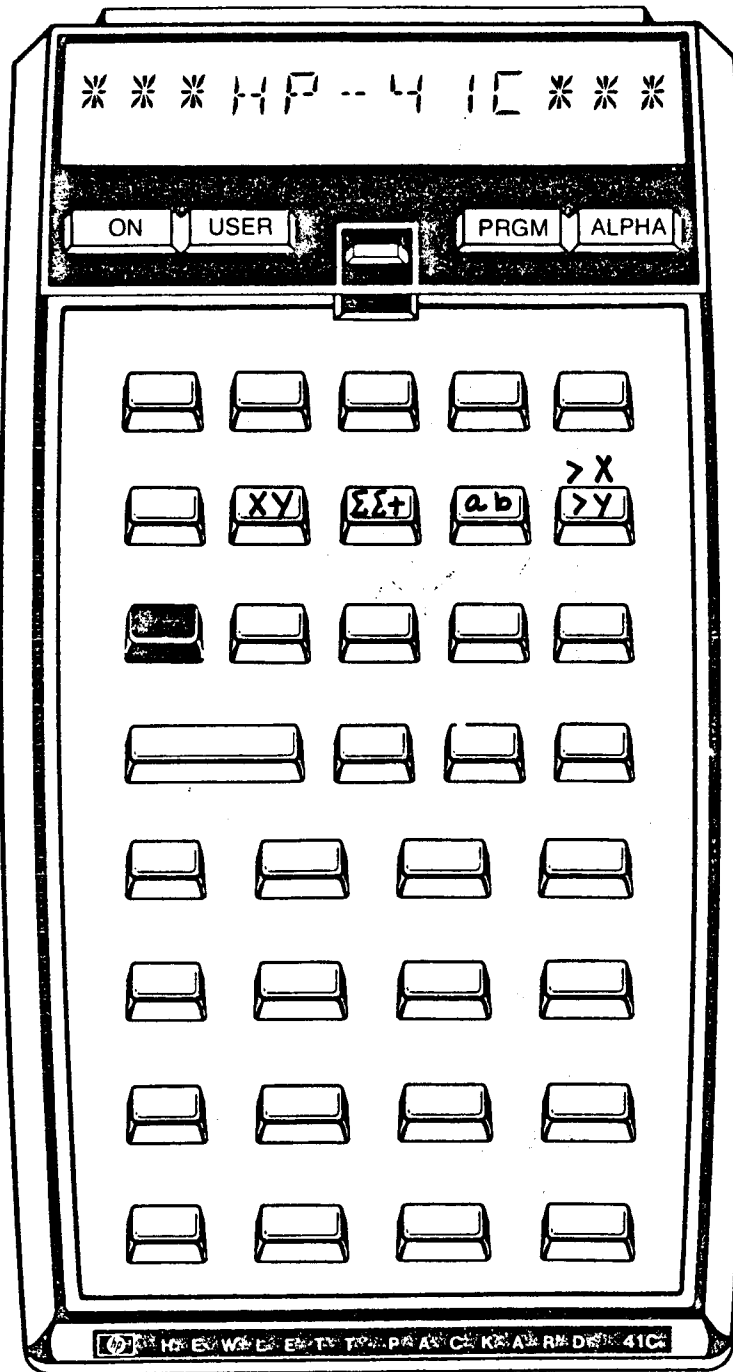
DATA REGISTERS				STATUS			
00	USED NO. OF CURVES	50	$\Sigma Y/X$ } #7	SIZE	100	TOT. REG.	USER MODE
	Σ		n	ENG		FIX 5	SCI OFF
	Σ		b	DEG	$\checkmark$	RAD	GRAD
	Σ		a	FLAGS			
05	USED r^2	55	$\Sigma \sqrt{X}$ } #6				
			ΣX	#	INIT S/C	SET INDICATES	CLEAR INDICATES
			ΣY	00	C	CALC. 9	
			ΣY^2	01	C	CALC. 2 IN	
			$\Sigma Y\sqrt{X}$			PRGM 2Y	
10		60	b } #5	01	C	(X, Y) Σ (DELETE) (X, Y) Σ t	
			a				
			ΣX^2				
			ΣX^4 } #4				
			ΣY				
15		65	ΣY^2 } #3				
			ΣYX^2				
			n				
			b				
			a				
20		70	$\Sigma \ln X$ } #2				
			$\Sigma (\ln X)^2$				
			$\Sigma (\ln Y)$				
			$\Sigma (\ln Y)^2$				
			$\Sigma (\ln Y)(\ln X)$				
25		75	n } #1				
			b				
			a				
			ΣX				
			ΣX^2 } #9				
30	b } #8	80	$\Sigma \ln Y$ } #7				
	a		$\Sigma (\ln Y)^2$				
	$\Sigma 1/X^2$		$\Sigma (\ln Y)X$				
	$\Sigma 1/X^2$		n				
	$\Sigma \ln Y$		b				
	$\Sigma (\ln Y)^2$		a				
	$\Sigma (\ln Y)/X$		$\Sigma \ln X$				
35	n } #6	85	$\Sigma (\ln X)^2$				
	b		ΣY				
	a		ΣY^2				
	$\Sigma 1/X$		$\Sigma Y(\ln X)$				
	$\Sigma 1/X^2$		n				
40	$\Sigma Y/Y$ } #5	90	b } #4				
	$\Sigma Y/Y'$		a				
	$\Sigma 1/YX$		ΣX				
	n		ΣX^2				
45	b } #3	95	ΣY				
	a		ΣY^2				
	$\Sigma 1/X$		ΣXY				
	$\Sigma 1/X^2$		n				
	ΣY						
	ΣY^2						

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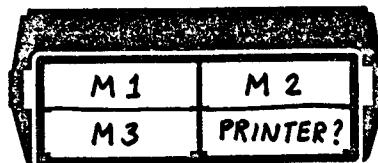
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KEYBOARD CARD LABELING

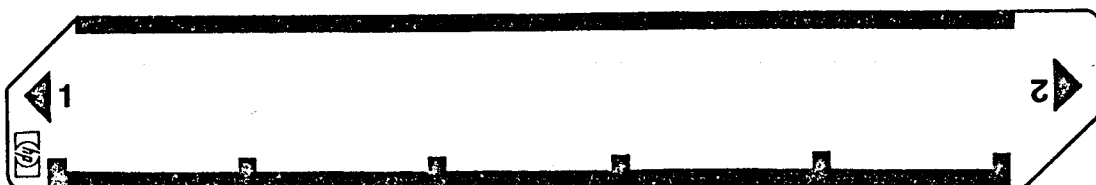
KEYBOARD



SYSTEM
CONFIGURATION



CARD



PILOTED LINEAR REGRESSION

PROGRAM REGISTERS NEEDED: 98

USERS' LIBRARY
PROGRAM NUMBER: 00397C
USE WITH ~+ ROUTINE

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ROW 1 (1 - 4)



ROW 2 (5 - 11)



ROW 3 (11 - 15)



ROW 4 (15 - 21)



ROW 5 (21 - 26)



ROW 6 (27 - 37)



ROW 7 (38 - 44)



ROW 8 (45 - 47)



ROW 9 (48 - 56)



ROW 10 (57 - 64)



ROW 11 (65 - 75)



ROW 12 (76 - 85)



ROW 13 (85 - 94)



ROW 14 (95 - 101)



ROW 15 (102 - 106)



ROW 16 (107 - 113)



ROW 17 (114 - 121)



ROW 18 (122 - 129)



ROW 19 (129 - 134)



ROW 20 (135 - 142)



ROW 21 (142 - 149)



ROW 22 (150 - 157)



ROW 23 (157 - 163)



ROW 24 (163 - 170)



ROW 25 (170 - 178)



ROW 26 (178 - 186)



ROW 27 (187 - 192)



ROW 28 (193 - 198)



ROW 29 (199 - 207)



ROW 30 (207 - 215)



ROW 31 (215 - 220)



ROW 32 (221 - 227)



ROW 33 (227 - 235)



ROW 34 (235 - 243)



ROW 35 (243 - 249)



ROW 36 (249 - 255)



ROW 37 (256 - 263)



ROW 38 (264 - 271)



ROW 39 (272 - 277)



ROW 40 (277 - 284)



ROW 41 (284 - 292)



ROW 42 (292 - 300)



ROW 43 (301 - 305)



ROW 44 (306 - 312)



ROW 45 (313 - 321)



ROW 46 (321 - 329)



ROW 47 (330 - 335)



ROW 48 (335 - 342)



ROW 49 (342 - 350)



ROW 50 (351 - 359)



ROW 51 (359 - 365)



ROW 52 (366 - 371)



ROW 53 (372 - 376)



PILOTED LINEAR REGRESSION

PROGRAM REGISTERS NEEDED: 22

USERS' LIBRARY
PROGRAM NUMBER: 00397C
USE WITH)Y ROUTINE

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ROW 1 (1 - 3)



ROW 2 (3 - 13)



ROW 3 (13 - 17)



ROW 4 (18 - 24)



ROW 5 (25 - 31)



ROW 6 (32 - 39)



ROW 7 (39 - 49)



ROW 8 (49 - 58)



ROW 9 (59 - 68)



ROW 10 (69 - 78)



ROW 11 (79 - 89)



ROW 12 (89 - 94)

