

00341C PROGRAM DESCRIPTION I

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Program Title MODIFIED CRESCENT CURVE FITTING.

Contributor's Name NAMIR C. SHAMMAS

Address _____

City _____ State _____ Zip Code _____

Program Description, Equations, Variables

This program fits, through a non-regularly spaced data of (X,Y) the eqn.

$$Y = A + B e^{KX}$$

where A, B and K are calculated in the program. In a regular crescent curve A and B would be equal. The method is called the WILLIAMS method, which requires an initial guess for K, then in an iterative process, the values of K will converge.

Necessary Accessories CARD READER, 2 MEMORY MODULES.

Operating Limits and Warnings A good guess will reduce calculation time.

Reference(s) HIMMELBLAU, "Process Analysis by Statistical Methods," page 199, 1970, WILEY.

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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The following data sets are to be fitted in a crescent shaped curve

<u>X</u>	<u>Y</u>
0.5	0.126314
1.0	0.143599
1.5	0.152906
2.0	0.156895
3.0	0.163543

ANSWER $Y = 0.16538 - 0.06780 \exp(-1.11257 X)$

```

XEQ SIZE 100
XEQ "DATA"

```

Input	Function	Display	Comments
	N?		
	X?	5.00000 RUN	
	Y?	.50000 RUN	
	X?	.126314 RUN	
	Y?	1.00000 RUN	
	X?	.143599 RUN	
	Y?	1.50000 RUN	
	X?	.152906 RUN	
	Y?	2.00000 RUN	
	X?	.156895 RUN	
	Y?	3.00000 RUN	
	X?	.163543 RUN	
	K?	XEQ "CALC"	
	a=0.16538	1.00000 RUN	
	b=-0.06780	RUN	
	K=1.11257	RUN	
	R2=0.99753	RUN	

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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 "DATA"			51	E+		
02	"N?"			52	X<>Y		
03	PROMPT			53	ISG 84		
04	2			54	RCL IND 84		
05	*			55	ST+ 93		
06	1			56	X↑2		
07	-			57	ST+ 92		
08	1 E3			58	SQRT		
09	/			59	*		
10	STO 84			60	ST+ 90		
11	LBL 00			61	RCL IND 84		
12	"X?"			62	RCL 89		
13	PROMPT			63	*		
14	STO IND 84			64	ST+ 91		
15	ISG 84			65	ISG 84		
16	"Y?"			66	GTO 02		
17	PROMPT			67	RCL 99		
18	STO IND 84			68	RCL 95		
19	ISG 84			69	*		
20	GTO 00			70	RCL 94		
21	RTN			71	X↑2		
22	LBL "CALC"			72	-		
23	"K?"			73	STO 83		
24	PROMPT			74	RCL 99		
25	STO 86			75	RCL 90		
26	LBL 01			76	*		
27	RCL 86			77	RCL 96		
28	X<0?			78	RCL 93		
29	ABS			79	*		
30	STO 86			80	-		
31	PSE			81	*		
32	ZREG 90			82	STO 87		
33	CLZ			83	RCL 99		
34	ZREG 94			84	RCL 98		
35	CLZ			85	*		
36	RCL 84			86	RCL 94		
37	FRC			87	RCL 96		
38	STO 84			88	*		
39	LBL 02			89	-		
40	RCL IND 84			90	STO 82		
41	RCL 86			91	RCL 99		
42	CHS			92	RCL 91		
43	*			93	*		
44	E↑X			94	RCL 94		
45	STO 89			95	RCL 93		
46	RCL IND 84			96	*		
47	CHS			97	-		
48	*			98	STO 81		
49	STO 88			99	*		
50	RCL 89			100	ST- 87		

DATA INPUT
ROUTINE

PROMPT FOR
GUESS K

CLER REGISTER
90 THROUGH 99

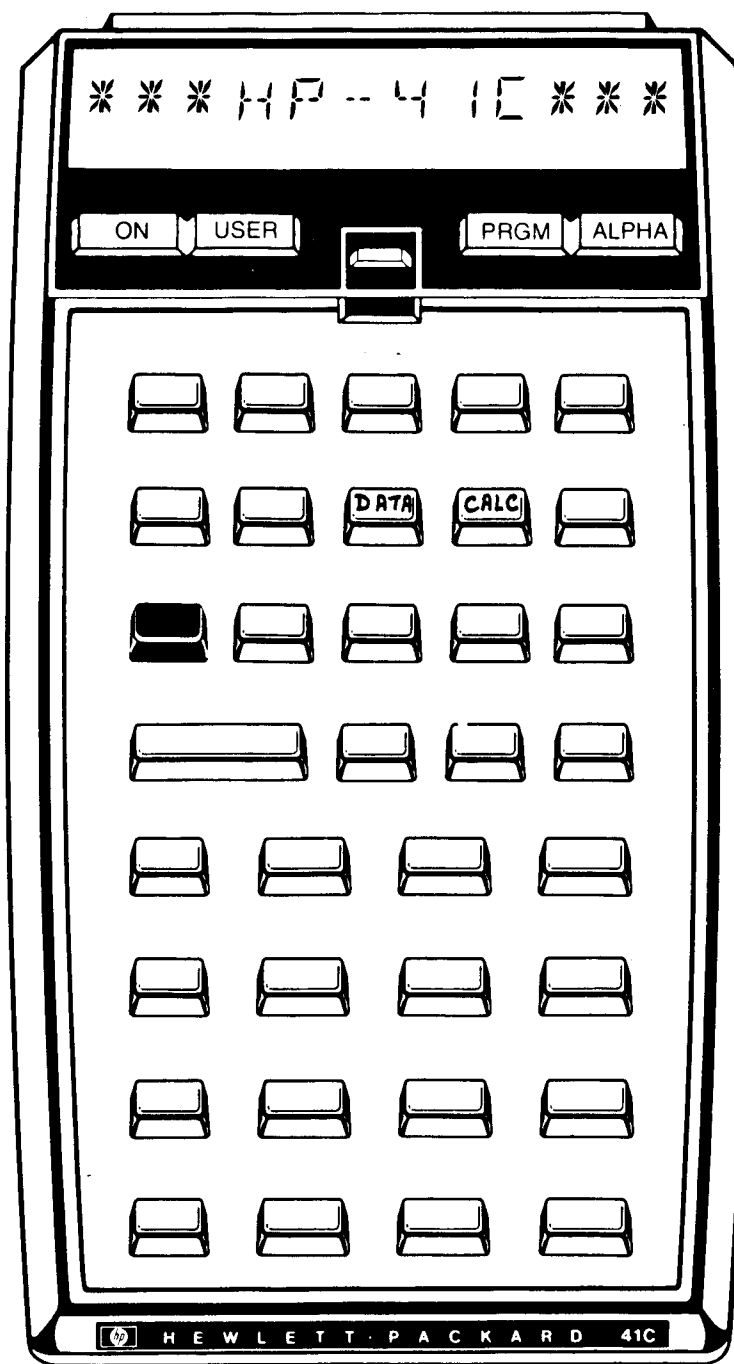
CALCULATIONS
TO SOLVE
FOR a, b & K

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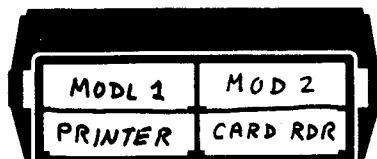
STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
101	RCL 99			151	GTO 03		
102	RCL 97			152	RCL 85		
103	*			153	STO 86		
104	RCL 96			154	GTO 01		
105	X $\uparrow$ 2			155	LBL 03		
106	-			156	BEEP		DISPLAY "a"
107	RCL 83			157	"a="		
108	*			158	ARCL 89		
109	RCL 82			159	PROMPT		DISPLAY "b"
110	X $\uparrow$ 2			160	"b="		
111	-			161	ARCL 88		
112	ST/ 87			162	PROMPT		DISPLAY "K"
113	RCL 87			163	"K="		
114	RCL 82			164	ARCL 85		
115	*			165	PROMPT		
116	CHS			166	RCL 89		
117	RCL 81			167	RCL 93		CALCULATE
118	+			168	*		γ^2
119	STO 88			169	RCL 88		
120	RCL 99			170	RCL 91		
121	RCL 95			171	*		
122	*			172	+		
123	RCL 94			173	RCL 87		
124	X $\uparrow$ 2			174	RCL 90		
125	-			175	*		
126	ST/ 89			176	+		
127	RCL 88			177	RCL 93		
128	RCL 94			178	X $\uparrow$ 2		
129	*			179	RCL 99		
130	RCL 87			180	/		
131	RCL 96			181	-		
132	*			182	RCL 92		
133	+			183	RCL 93		
134	CHS			184	X $\uparrow$ 2		
135	RCL 93			185	RCL 99		
136	+			186	/		
137	RCL 99			187	-		
138	/			188	/		
139	STO 89			189	"R2="		
140	RCL 87			190	ARCL X		
141	RCL 88			191	AVIEW		
142	/			192	BEEP		
143	RCL 86			193	RTN		
144	+			194	END.		
145	STO 85						
146	RCL 86						
147	-						
148	ABS						
149	RND						
150	X=0?						
			COMPARE K'S OF 2 SUCCESS ITERATIONS AND TEST FOR CON- VERGENCE	00			

KEYBOARD CARD LABELING

KEYBOARD



SYSTEM
CONFIGURATION



CARD



ROW 1 (1 - 4)



ROW 2 (5 - 12)



ROW 3 (13 - 19)



ROW 4 (20 - 23)



ROW 5 (23 - 32)



ROW 6 (32 - 40)



ROW 7 (41 - 49)



ROW 8 (50 - 57)



ROW 9 (58 - 65)



ROW 10 (66 - 73)



ROW 11 (74 - 82)



ROW 12 (82 - 90)



ROW 13 (90 - 98)



ROW 14 (98 - 106)



ROW 15 (107 - 114)



ROW 16 (115 - 123)



ROW 17 (123 - 131)



ROW 18 (131 - 140)



ROW 19 (140 - 148)



ROW 20 (149 - 157)



ROW 21 (157 - 163)



ROW 22 (163 - 170)



ROW 23 (171 - 179)



ROW 24 (180 - 189)



ROW 25 (189 - 194)

