

Program Title AREA UNDER CURVEContributor's Name NAMIR C. SHAMMAS

Address _____

City _____ State _____ Zip Code _____

Program Description, Equations, Variables Based on 3 points (x_0, y_0) , (x_1, y_1) , (x_2, y_2) The area is calculated as

$$\text{AREA} = \int_{x_0}^{x_2} y \, dx = \left[\frac{A}{3} x^3 + \frac{B}{2} x^2 + C x \right]_{x_0}^{x_2}$$

where

$$A = (\alpha_0 + \alpha_1 + \alpha_2), \quad B = -[\alpha_0(x_1 + x_2) + \alpha_1(x_0 + x_2) + \alpha_2(x_1 + x_0)]$$

$$C = \alpha_0 x_1 x_2 + \alpha_1 x_0 x_2 + \alpha_2 x_0 x_1$$

$$\alpha_0 = y_0 / [(x_0 - x_1)(x_0 - x_2)], \quad \alpha_1 = y_1 / [(x_1 - x_0)(x_1 - x_2)]$$

$$\alpha_2 = y_2 / [(x_2 - x_0)(x_2 - x_1)]$$

The program enables the user to input more data (2 pairs at a time). The method has been developed based on the Lagrangian interpolation, that yields a quadratic equation that can be integrated. can be adapted as a subroutine.

Necessary Accessories CARD READER

Operating Limits and Warnings An odd number of points. Although method deals with unequally spaced points, accuracy will decrease as (or during) a wide interval spacing.

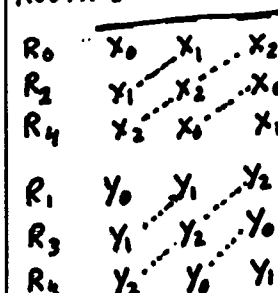
Reference(s) ANY TEXTBOOK IN NUMERICAL ANALYSIS

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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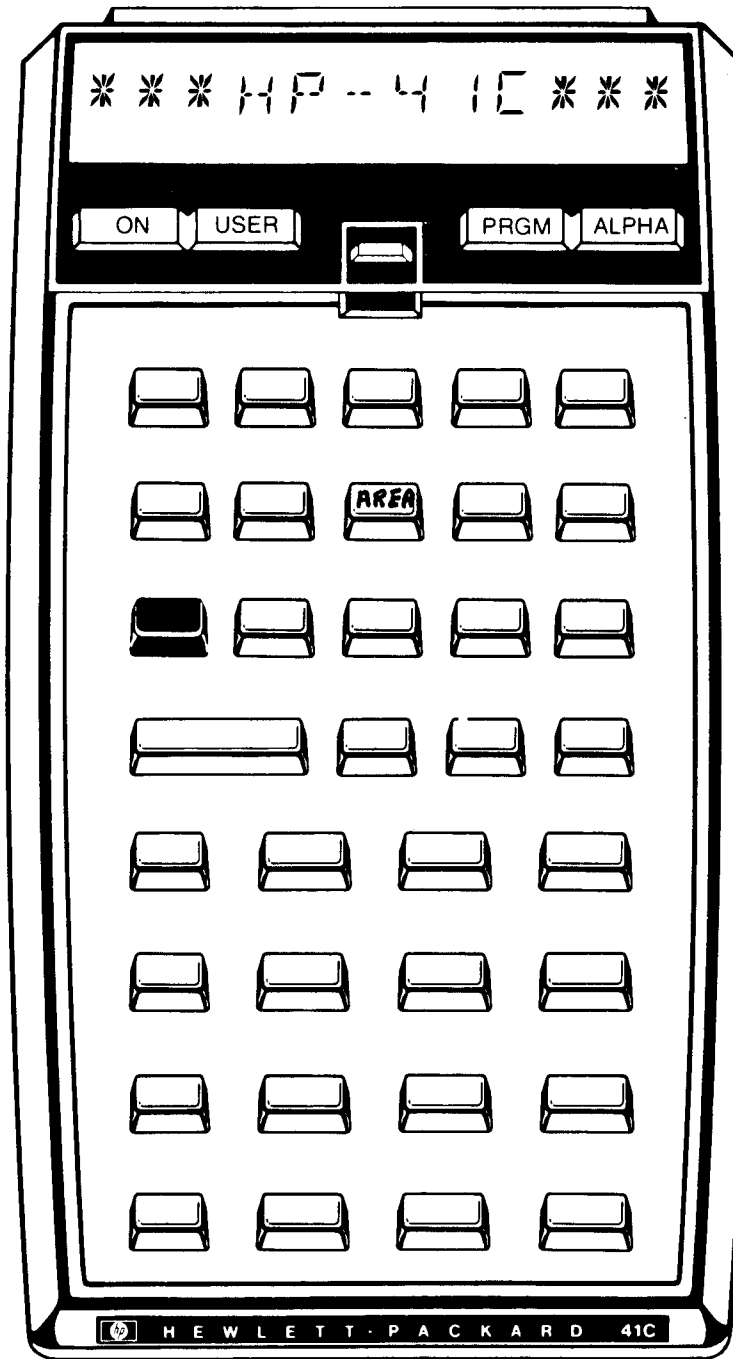
STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS	STEP/ LINE	KEY ENTRY	KEY CODE (67/97 only)	COMMENTS
01	LBL "ARE A"		INITIALIZE	50	RCL 00		CALCULATE
02	0			51	RCL 02		COEFF FOR
03	STO 09			52	-		LAGRANGIAN
04	TONE 5			53	RCL 00		EQN.
05	"X0↑Y0?"			54	RCL 04		
06	PROMPT		PROMPT FOR	55	-		
07	STO 01		DATA	56	*		
08	X<>Y			57	/		
09	STO 00			58	ST+ 06		
10	LBL 00			59	STO Y		
11	CF 22			60	RCL 02		
12	"X1↑Y1?"			61	RCL 04		
13	TONE 5			62	+		
14	PROMPT		IF NO DATA INPUT	63	*		
15	FC? 22		DISPLAY AREA	64	ST+ 07		
16	GT0 04			65	X<>Y		
17	STO 03			66	RCL 02		
18	X<>Y			67	*		
19	STO 02			68	RCL 04		
20	"X2↑Y2?"			69	*		
21	TONE 5			70	ST+ 08		
22	PROMPT			71	RTN		
23	STO 05			72	LBL 02		ROTATION OF DATA
24	X<>Y			73	RCL 05		ROUTINE
25	STO 04			74	X<> 03		
26	0		INITIALIZE	75	X<> 01		
27	STO 06		QUADARATIC EQN.	76	STO 05		
28	STO 07		COEFF.	77	RCL 04		
29	STO 08			78	X<> 02		
30	XEQ 01		CALCULATE &	79	X<> 00		
31	XEQ 02		ROTATE DATA	80	STO 04		
32	XEQ 01		TWICE.	81	RTN		
33	XEQ 02			82	LBL 03		
34	XEQ 01			83	ENTER↑		
35	RCL 00			84	ENTER↑		
36	XEQ 03		$\rightarrow F(x_2) = \int y dx$	85	ENTER↑		
37	ST+ 09			86	RCL 06		
38	RCL 02			87	*		
39	XEQ 03		$\rightarrow F(x_0) = \int y dx$	88	3		
40	ST- 09			89	/		
41	GT0 00			90	RCL 07		
42	LBL 04			91	2		
43	"AREA="			92	/		
44	ARCL 09			93	-		
45	BEEP			94	*		
46	AVIEW			95	RCL 08		
47	RTN			96	+		
48	LBL 01			97	*		
49	RCL 01			98	RTN		
				99	END		

ROTATION OF DATA
ROUTINEEVALUATE
 $F(x)$ NOTE:
AREA = $F(x_2) - F(x_0)$

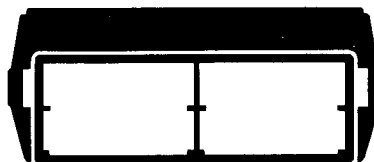
003510

KEYBOARD CARD LABELING

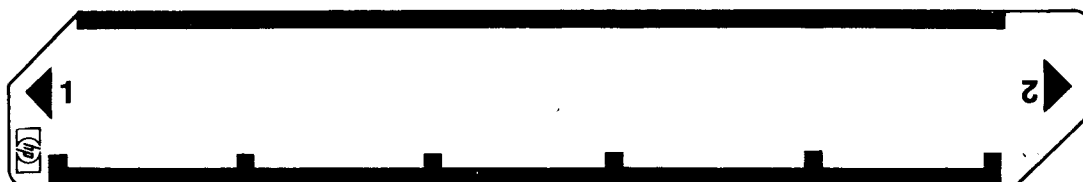
KEYBOARD



SYSTEM
CONFIGURATION



CARD



AREA UNDER CURVE

USERS' LIBRARY
PROGRAM NUMBER: 00351C

PAGE 1
OF 1

PROGRAM REGISTERS NEEDED: 24

ROW 1 (1 - 5)



ROW 2 (5 - 11)



ROW 3 (12 - 16)



ROW 4 (16 - 21)



ROW 5 (22 - 31)



ROW 6 (31 - 36)



ROW 7 (36 - 43)



ROW 8 (43 - 50)



ROW 9 (51 - 61)



ROW 10 (62 - 72)



ROW 11 (73 - 81)



ROW 12 (82 - 94)



ROW 13 (95 - 99)

