TITLE
TITEL
TITRE

Solution of cubic equation

PROGRAMMER
PROGRAMMIERER
PROGRAMMEUR

georger420

DATE
DATUM
DATE

5. 1. 1981

TI PROGRAMMABLE 57

PROGRAM
RECORDPROGRAMM-
BERICHTFICHE PROGRAMME

PROGRAM DESCRIPTION – PROGRAMM BECHREIBUNG – DESCRIPTION DU PROGRAMME

Calculates roots x_1, x_2 and x_3 of cubic equation in shape: $x^3 + ax^2 + bx + c = 0$ (every cubic equation can be converted into this shape).

Program uses Linn's iterational method. Tt tries by iterations to find out r number that polynomial $x^3 + ax^2 + bx + c = 0$ will be divisible by binomial $x + r$ without reminder (or with expected accuracy). If number r is found, original polynomial is divised by $x + r$ and so converted into quadratic equation $x^2 + Bx + C = 0$ which is simply solvable. The x_1 root is:
$x_1 = -r$

The iterational formula for r number is:

$$r_{i+1} = \frac{c}{b - r_i \cdot (a - r_i)}$$

Coeficients of following quadratic equations are:

$B = a - r$
$C = b - r\ (a - r)$

The roots x_2 and x_3 are obtained by solution of quadratic equation.

Earlier version of this program was published in czech technical magazine „Sdělovací technika“ at January 1982 issue.

USER INSTRUCTIONS – BENUTZER INSTRUCTIONEN – MODE D´ EMPLOI

STEP SCHRITT SEQ	PRESS BEFEHL APPUYER SUR	DISPLAY ANZEIGE AFFICHAGE
1	INV 2nd C.t	
2	a = STO 2, b = STO 3, c = STO 4	
3	1 STO 0 , 0.0000001 STO 7 , SBR 0	Then initial value of *r* number is in R0 reg.
4a	When display doesn't blink program got the root x1 and its	
	Negative value is in R0	
5a	RCL 0	x1
6a	RST , R/S → x2 is on display	x2
7a	X<->t	x3
4b	When the result of SBR 0 is blinking display, program failed to	
	calculate x1, it cannot convert equation into quadratic and	
	cannot solve also x2 and x3	

FLOW CHARTS / NOTES FLUSSDIAGRAMM / BEMERKUNGEN ORGANIGRAMME / NOTES	KEY TASTE TOUCHE	LOC ADR ADR	CODE KODE CODE	COMMENTS BEMERKUNGEN COMENTAIRES
	SBR 2	00	61 2	
	RCL 5	01	33 5	
	+/-	02	84	
	:	03	45	
	2	04	02	
	=	05	85	
	STO 1	06	32 1	
	STO 7	07	32 7	
	x2	08	23	
	-	09	65	
	RCL 6	10	33 6	
	=	11	85	
	SQR(x)	12	24	
	SUM 1	13	34 1	
	INV SUM 7	14	- 34 7	
	RCL 1	15	33 1	
	R/S	16	81	
	2nd LBL 0	17	86 0	
	SBR 2	18	61 2	
	RCL 4	19	33 4	
	:	20	45	
	RCL 6	21	33 6	
	=	22	85	
	STO 5	23	32 5	
	-	24	65	
	RCL 0	25	33 0	
	=	26	85	
	2nd |x|	27	40	
	INV 2nd x<->t	28	- 27	
	GTO 1	29	51 1	
	RCL 5	30	33 5	
	STO 0	31	32 0	
	GTO 0	32	51 0	
	2nd LBL 1	33	86 1	
	R/S	34	81	
	INV SBR	35	- 61	
	2nd LBL 2	36	86 2	
	RCL 2	37	33 2	
	-	38	65	
	RCL 0	39	33 0	
	)	40	44	
	STO 5	41	32 5	
	x	42	55	
	RCL 0	43	33 0	
	+/-	44	84	
	+	45	75	
	RCL 3	46	33 3	
	)	47	44	
	STO 6	48	32 6	
	INV SBR	49	- 61	

DATA REGISTERS DATENSPEICHER REGISTRES-MEMOIRE			LABELS LABELS LABELS	
0	Dsz			
1				
2				
3				
4				
5	(AOS)			
6	(AOS)			
7	(t)			

TEXAS INSTRUMENTS