HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD

73001 - ANNUAL INTEREST

Calculates i that satisfies the equation:

Computer Museum

$$R = \frac{P\, i(1+i)^n}{(1+i)^n - 1}$$

73008 - AMORTIZED LOAN

Calculates the monthly payment on the principal of a loan for a specified term, the amount of payments toward principal and interest, and a running total of the amount of payments toward principal and interest to date.

9100B ONLY

73101 - RETURN ON INVESTMENT FOR UP TO 16 VARYING CASH FLOWS

This program solves for the value of interest per period for up to sixteen varying cash flows. The program solves the equation:

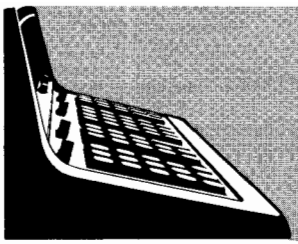
$$\text{PV (Present Value)} = \sum_{k=1}^{16} \frac{C_k}{(1+i)^k}$$

where C_k represents a cash flow per period.

HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD



PART NO.
09100-73001

ANNUAL INTEREST

This program calculates i that satisfies the equation

$$R = P\,\frac{i(1+i)^n}{(1+i)^n - 1}$$

for a given R, P , and n .

where R = monthly payment
P = principal amount
n = number of monthly payments
i = monthly interest rate

The program uses this i and calculates and displays an annual interest.

The solution is based on a Newton-Raphson iteration technique which converges to a point which satisfies the condition

$$\left| i_K - i_{K-1} \right| \leq 10^{-9}$$

Note i_K is the K^{th} estimate of i and i_{K-1} is the $(K-1)^{th}$ estimate of i . The initial estimate of i is R/P unless otherwise specified. If the solution does not converge it may be necessary to enter a better initial estimate.

The value of i that satisfies the equation

$$f(i) = (1+i)^n (R - Pi) - R = 0$$

is found. The annual interest is displayed.

Reference: Principles of Engineering Economy
by E. L. Grant

Ronald Press, N.Y. 1950

USER INSTRUCTIONS

ENTER PROGRAM (Starting Address is 0-0)

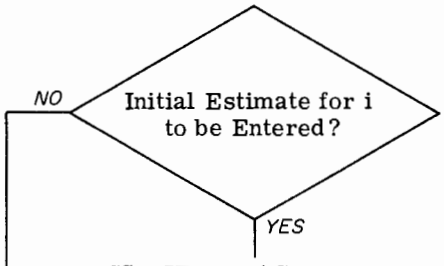
PRESS: GO TO (0) (0) [or END]

PRESS: CONTINUE

DISPLAY

0 —— Z
0 —— Y
1 —— X

ENTER DATA: P → Z, R → Y, n → X



PRESS: SET FLAG

PRESS: CONTINUE

DISPLAY

0 —— Z
0 —— Y
2 —— X

ENTER DATA: (estimated i percent) $i_{est}\%$ → X

PRESS: CONTINUE

DISPLAY

0 —— Z
0 —— Y
i —— X

(i is annual interest)

EXAMPLES

P = $10,000

R = $276.45

n = 40 months

i = 5.999% (Note: This is annual interest)

P = $2500

R = $81.95

n = 36 months

i = 11.087%

PART NO. 09100-73001

HEWLETT·PACKARD

Step		Key	Code	Display x	Display y	Display z	Storage f	Storage e	Storage d	Storage c	Storage b	Storage a	
0	0	CLEAR	20										
	1	1	01	DISPLAY 1 TO INDICATE FIRST ENTRY									
	2	STOP	41	N	R	P	ENTER N,R, AND P						
	3	ACC +	60										BRANCH FOR i_{est} ENTRY
	4	ROLL ↑	22										
	5	x→( )	23										
	6	d	17										
	7	IF FLAG	43										
	8	1	01										
	9	3	03										
	a	ROLL ↑	22										GENERATE $i_{est} = \frac{R}{P}$
	b	x⇄y	30										
	c	÷	35										
	d	↓	25										
1	0	GO TO( )( )	44										BRANCH TO ITERATION
	1	2	02										
	2	1	01										
	3	CLEAR x	37										
	4	↑	27										
	5	↑	27										
	6	2	02	DISPLAY 2 TO INDICATE SECOND ENTRY									
	7	STOP	41	i_{est}	0	0	ENTER i_{est} IN PERCENT						
	8	↑	27										CONVERT ANNUAL INTEREST RATE IN PERCENT TO MONTHLY RATE.
	9	1	01										
	a	2	02										
	b	0	00										
	c	0	00										
	d	÷	35										
2	0	↓	25										
	1	x→( )	23										
	2	b	14										
	3	↑	27										
	4	1	01										
	5	+	33										
	6	↓	25										
	7	↑	27										
	8	ln x	65										
	9	ROLL ↑	22										CALCULATE AND STORE $(i_K+1)^n$
	a	f	15										
	b	×	36										
	c	↓	25										
	d	e^x	74										

FROM 6-c

Step		Key	Code	Display x	Display y	Display z	Storage f	Storage e	Storage d	Storage c	Storage b	Storage a
3	0	$x \rightarrow ()$	23									
	1	c	16									
	2	1	01									
	3	$x \rightleftarrows y$	30									
	4	÷	35									
	5	d	17									
	6	ROLL ↑	22									
	7	b	14									
	8	×	36									
	9	e	12									
	a	$x \rightleftarrows y$	30									
	b	−	34									
	c	↓	25									
	d	×	36									
4	0	ROLL ↓	31									
	1	$x \rightleftarrows y$	30									
	2	f	15									
	3	×	36									
	4	d	17									
	5	−	34									
	6	c	16									
	7	×	36									
	8	$x \rightleftarrows y$	30									
	9	ROLL ↓	31									
	a	×	36									
	b	e	12									
	c	−	34									
	d	ROLL ↓	31									
5	0	$x \rightleftarrows y$	30									
	1	÷	35									
	2	b	14									
	3	$x \rightleftarrows y$	30									
	4	−	34									
	5	$x \rightleftarrows y$	30									
	6	$x \rightarrow ()$	23									
	7	b	14									
	8	↑	27									
	9	1	01									
	a	2	02									
	b	0	00									
	c	0	00									
	d	×	36									

CALCULATE $f'(i_K) = (1+i_K)^n \left(\frac{n(R-Pi_K)}{1+i_K} - P \right)$

CALCULATE $f(i_K)$

CALCULATE $\frac{f(i_K)}{f'(i_K)}$

CALCULATE $i_{K+1} = i_K - \frac{f(i_K)}{f'(i_K)} = i_K - \Delta_K$

CONVERT i_{K+1} TO ANNUAL PERCENTAGE FOR DISPLAY

HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD

PART NO. 09100-73001

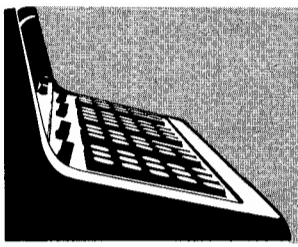
Step	Key	Code	Display x	Display y	Display z	Storage f	Storage e	Storage d	Storage c	Storage b	Storage a	
6 0	CLEAR x	37										
1	ROLL ↓	31										
2	PAUSE	57	i_{K+1} %	Δ_K	0							DISPLAY EACH ITERATION
3	|y|	55										
4	ROLL ↑	22										
5	ENTER EXP	26										
6	0	00										
7	9	11										COMPARE $\lvert i_{K+1} - i_K \rvert$ TO 10^{-9} TOLERANCE. IF LESS THAN
8	CHG SIGN	32										10^{-9}. BRANCH TO DISPLAY. IF GREATER THAN 10^{-9}
9	ROLL ↑	22										CONTINUE ITERATION.
a	IF x>y	53										
b	2	02										
c	2	02										
d	CLEAR x	37										
7 0	x⇄y	30										CLEAR AND POSITION i_{K+1}
1	CLEAR x	37										
2	ROLL ↑	22										
3	END	46	i	0	0							DISPLAY
4												
5												
6												
7												
8												
9												
a												
b												
c												
d												
0												
1												
2												
3												
4												
5												
6												
7												
8												
9												
a												
b												
c												
d												

HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD

HEWLETT·PACKARD

Step	Key	Code	Display			Storage					
			x	y	z	f	e	d	c	b	a
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											

HEWLETT·PACKARD
HEWLETT·PACKARD
HEWLETT·PACKARD
HEWLETT·PACKARD



PART NO.
09100-73008

AMORTIZED LOAN

This program calculates the monthly payment necessary to amortize a loan over a specified number of periods. The principal, annual interest rate, and term of the loan in months are provided by the user.

The program displays (or prints) the calculated monthly payment, showing the amount paid toward principal and the amount of interest for each payment. After each payment, the total principal paid, total interest paid and the remaining loan balance may be displayed. After displaying the last payment, the program ends displaying the total principal paid, the total interest paid and the total interest and principal paid.

The monthly payment is constant. The amount paid in interest is one-twelfth the annual interest rate times the remaining principal. The remainder of the monthly payment is subtracted from the principal balance.

The following equations are used:

$$\text{Percent Monthly Interest } (i') = \frac{\text{Annual interest rate } (i)}{12}$$

$$\text{Monthly Payment } (P') = \frac{\frac{S_i}{1200}\,(1 + i/1200)^n}{(1 + i/1200)^n - 1}$$

where S is the amount of the loan (original principal) and n is the term of the loan in periods.

$P = P'$ rounded up

Monthly Payment Paid on Principal $(P_M) = P - I$

Monthly Interest Payment $(I) = P_R \times i'$

Remaining Loan Balance $(P_R) = S - P_T$

Total Principal Paid to date $(P_T) = \sum_{a=0}^{n} P_{M_a}$

Total Interest Paid to date $(I_T) = \sum_{a=0}^{n} I_a$

Total Amount Paid on loan to date $= P_T + I_T$

HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD

USER INSTRUCTIONS

ENTER PROGRAM (Starting Address is 0 - 0)

PRESS: GO TO (0) (0) [or END]

PRESS: CONTINUE

DISPLAY:

0 ——— Z
0 ——— Y
0 ——— X

ENTER DATA: Loan principal in Dollars → Z
Interest Rate in Percent → Y
Term of loan in Monts → X

PRESS: CONTINUE

DISPLAY:

0 ——— Z
0 ——— Y
Calculated Monthly Payment raised to nearest cent — X

Is a Different monthly payment desired?

YES → ENTER DATA: Desired monthly payment → X

NO

PRESS: CONTINUE

DISPLAY: For each month the following brief display occurs:

Amount of Payment toward Principal — Z
Amount of Payment toward Interest — Y
Payment Number —— X

To stop display - PRESS: PAUSE

If desired, while stopped,

PRESS: SET FLAG

PRESS: CONTINUE

USER INSTRUCTIONS (con't)

DISPLAY:

Total Principal Paid to date —— Z
Total Interest Paid to date —— Y
Remaining Loan Balance —— X

To continue incrementing payments -

PRESS: CONTINUE

Has the entire loan been paid?

NO

YES

DISPLAY:

Amount of Last Payment to Principal —— Z
Amount of Last Payment to Interest —— Y
Payment Number ——— X

PRESS: CONTINUE

DISPLAY:

Total Principal Paid ——— Z
Total Interest Paid ——— Y
Total Interest and Principal paid ——— X

Note: To print out, substitute program steps noted in program listing.

EXAMPLES

Example 1

Borrow $1,000 at 6.25%
for 5 years and 3 months.

PRESS: GO TO (0) (0) [or END]

PRESS: CONTINUE

ENTER DATA:

1000 ⟶ Z
6.25 ⟶ Y
63 ⟶ X

PRESS: CONTINUE
DISPLAY:

0 ——— Z
0 ——— Y
18.67 ——— X

Calculated monthly payment = $18.67

PRESS: CONTINUE

PRESS: PAUSE when display for 36 months is reached.

DISPLAY:

16.15 — Z - Payment toward Principal
2.52 — Y - Payment toward Interest
36 — X - Payment Number

PRESS: SET FLAG and CONTINUE
DISPLAY:

531.51 — Z - Total Principal Paid to Date
140.61 — Y - Total Interest Paid to Date
468.49 — X - Loan Balance

PRESS: CONTINUE

PROGRAM STOPS TO DISPLAY

17.88 — Z - Final Payment - Principal
.09 — Y - Final Payment - Interest
63 — X - Payment Number

PRESS: CONTINUE

DISPLAY:

1000 ——— Z - Total Paid - Principal
175.51 ——— Y - Total Paid - Interest
1175.51 ——— X - Total Paid

Example 2

Borrow $1,000 at 6.25%
for 5 years and 3 months.

PRESS: GO TO (0) (0) [or END]

PRESS: CONTINUE

ENTER DATA:

1000 ⟶ Z
6.25 ⟶ Y
63 ⟶ X

PRESS: CONTINUE
DISPLAY:

0 ——— Z
0 ——— Y
18.67 ——— X

ENTER: $19.00 into X register.

PRESS: CONTINUE

PRESS: PAUSE when display for 36 months is reached.

DISPLAY:

16.54 ——— Z - Payment - Principal
2.46 ——— Y - Payment - Interest
36 ——— X - Monthly Payment

PRESS: SET FLAG and CONTINUE
DISPLAY:

544.54 ——— Z - Total Principal Paid to Date
139.46 ——— Y - Total Interest Paid to Date
455.46 ——— X - Loan Balance

PRESS: CONTINUE

PROGRAM STOPS TO DISPLAY

12.72 ——— Z - Final Payment to Principal
.07 ——— Y - Final Payment to Interest
62 ——— X - Payment Number

PRESS: CONTINUE

DISPLAY:

1000 ——— Z - Total Paid - Principal
171.79 ——— Y - Total Paid - Interest
1171.79 ——— X - Total Paid

PART NO 09100-73008

Step	Key	Code	Display x	Display y	Display z	Storage f	Storage e	Storage d	Storage c	Storage b	Storage a	
0 0	CLEAR	20										
1	x→( )	23										
2	9	11										
3	STOP	41	n	i	S							ENTER AMOUNT OF THE LOAN, (S), INTEREST, (i), AND PERIODS, (n).
4	CONTINUE	47										
5	x→( )	23										STORE n
6	d	17										
7	1	01										CALCULATE MONTHLY INTEREST AS PERCENT
8	2	02										
9	÷	35										
a	y→( )	40										
b	c	16										
c	ENTER EXP	26										CALCULATE MONTHLY INTEREST AS FRACTION
d	2	02										
1 0	÷	35										
1	↓	25										
2	y→( )	40										STORE S
3	b	14										
4	×	36										CALCULATE $(1+\frac{i}{1200})^n$
5	↑	27										
6	1	01										
7	+	33										
8	d	17										
9	x⇄y	30										
a	ln x	65										
b	×	36										
c	↓	25										
d	e^x	74										
2 0	×	36										CALCULATE MONTHLY PAYMENT $P' = \frac{\frac{S\,i}{1200}(1+\frac{i}{1200})^n}{(1+\frac{i}{1200})^n - 1}$
1	↑	27										
2	1	01										
3	−	34										
4	ROLL ↓	31										
5	÷	35										
6	ENTER EXP	26										ROUND UP TO NEAREST CENT
7	2	02										
8	×	36										
9	↓	25										
a	↑	27										
b	int x	64										
c	x⇄y	30										
d	IF x>y	53										

HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD

Computer Museum

HEWLETT·PACKARD

Step		Key	Code	Display x	Display y	Display z	Storage f	Storage e	Storage d	Storage c	Storage b	Storage a	
3	0	↓	25										
	1	+	33										
	2	ENTER EXP	26										
	3	2	02										
	4	÷	35										
	5	CLEAR x	37										CLEAR AND DISPLAY P MONTHLY PAYMENT ROUNDED UP
	6	↑	27										
	7	ROLL ↑	22										
	8	CONTINUE	47										
	9	STOP	41	P	0	0							
	a	CONTINUE	47										
	b	x→( )	23										STORE P
	c	a	13										
	d	y⇄( )	24										
4	0	9	11										RECALL COUNTER AND N
	1	d	17										
	2	IF x=y	50										BRANCH WHEN CALCULATION IS COMPLETE
	3	8	10										
	4	7	07										
	5	1	01										INCREMENT COUNTER
	6	+	33										
	7	y→( )	40										
	8	9	11										
	9	b	14										CALCULATE MONTHLY INTEREST PAYMENT (I) AND ROUND UP
	a	↑	27										
	b	c	16										
	c	×	36										
	d	·	21										
5	0	5	05										
	1	+	33										
	2	↓	25										
	3	int x	64										
	4	↑	27										
	5	ENTER EXP	26										
	6	2	02										
	7	÷	35										
	8	a	13										CALCULATE P-I = AMOUNT OF PAYMENT PAID ON PRINCIPAL
	9	x⇄y	30										
	a	−	34										
	b	ROLL ↓	31										
	c	y⇄( )	24										
	d	b	14										RECALL AMOUNT OWED ON PRINCIPAL

FROM 7-6, 8-0

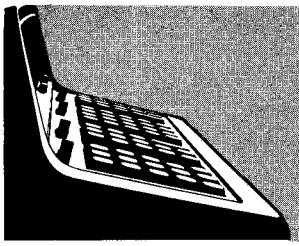
HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD HEWLETT-PACKARD

Step		Key	Code	Display x	Display y	Display z	Storage f	e	d	c	b	a	
6	0	IF $x>y$	53										BRANCH WHEN THROUGH i.e., AMOUNT PAID ON PRINCIPAL EXCEEDS AMOUNT OWED.
	1	8	10										
	2	1	01										
	3	−	34										CALCULATE & STORE CURRENT AMOUNT OWED ON PRINCIPAL
	4	$y\rightleftarrows$ ( )	24										
	5	b	14										
	6	ROLL ↑	22										ACCUMULATE AMOUNT PAID ON PRINCIPAL AND INTEREST
	7	ACC +	60										
	8	ROLL ↑	22										
	9	PAUSE	57	n	I	P_M							DISPLAY PAYMENT NUMBER, AMOUNT OF PAYMENT FOR INTEREST & PRINCIPAL
	a												
	b												
	c												
	d												
7	0	PAUSE	57										
	1	IF FLAG	43										BRANCH WHEN FLAG SET TO DISPLAY TOTAL AMOUNT FOR PRINCIPAL & INTEREST PAID IN, & AMOUNT OWED ON PRINCIPAL
	2	7	07										
	3	7	07										
	4	GO TO ( ) ( )	44										BRANCH TO CONTINUE CALCULATION
	5	3	03										
	6	d	17										
	7	RCL	61										
	8	↑	27										
	9	b	14										
	a	STOP	41	P_R	I_T	P_T							DISPLAY REMAINING LOAN BALANCE, TOTAL INTEREST PAID AND TOTAL PRINCIPAL PAID
	b	CONTINUE	47										
	c	GO TO ( ) ( )	44										
	d	3	03										
8	0	d	17										
	1	b	14										
	2	ROLL ↓	31										ACCUMULATE TOTAL INTEREST PAID AND TOTAL PAID ON PRINCIPAL
	3	$x\rightleftarrows y$	30										
	4	ACC +	60										
	5	ROLL ↑	22										
	6	STOP	41	n	I	P_M							DISPLAY FINAL PAYMENT TO INTEREST, AND FINAL PRINCIPAL PAYMENT
	7	RCL	61										CALCULATE TOTAL AMOUNT PAID IN, TOTAL INTEREST, AND TOTAL PRINCIPAL AND DISPLAY
	8	↑	27										
	9	↓	25										
	a	+	33										
	b	$x\rightleftarrows y$	30										
	c	CONTINUE	47										
	d	END	46	T	I_T	P_T							

FROM 4-4

HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD HEWLETT·PACKARD

Step	Key	Code	Display			Storage					
			x	y	z	f	e	d	c	b	a
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
a											
b											
c											
d											



RETURN ON INVESTMENT FOR UP TO 16 VARYING CASH FLOWS

9100B ONLY
PART NO.
09100-73101

This program solves for the value of interest per period for up to 16 varying cash flows. The program solves the equation:

$$\text{Present Value (P.V.)} = \sum_{k=1}^{N} \frac{C_k}{(1+i)^k} \qquad N \leq 16$$

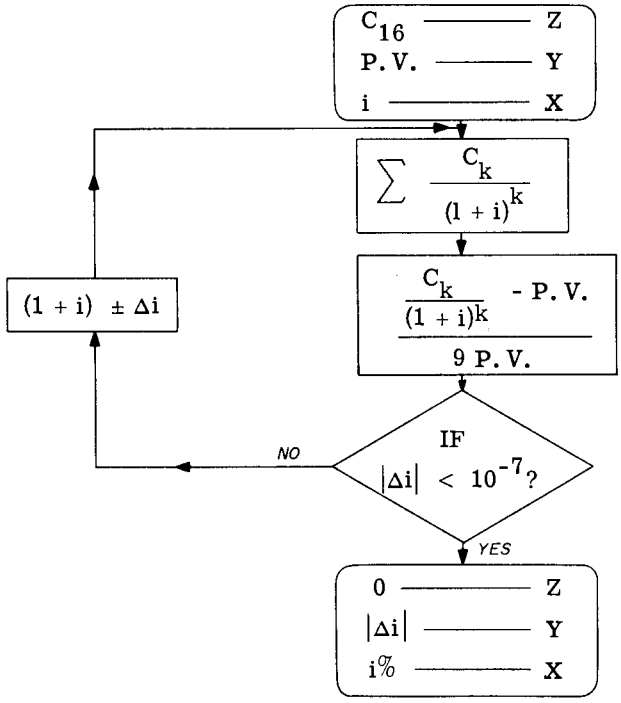
for i to an accuracy better than 10^{-7}.

C_k = cash flow per period

i = discount rate per period

FLOWCHART

Present Value = $\sum_{k=1}^{N} \frac{C_k}{(1+i)^k}$



ENTER: i% guess in X, if desired, otherwise enter only P. V. and C_{16} ;

= ± Δi

DISPLAY

Reference: Financial Management - Analytical Approach, by J. Robert Lindsay and Arnold W. Sametz, Richard D. Irwin, Inc. 1967.

USER INSTRUCTIONS

PRESS: END

ENTER PROGRAM: Side A followed by Side B

PRESS: CONTINUE

DISPLAY

0	Z
0	Y
0	X

ENTER DATA: $C_3 \rightarrow Z$, $C_2 \rightarrow Y$, $C_1 \rightarrow X$

PRESS: CONTINUE

DISPLAY

0	Z
0	Y
1	X

ENTER DATA: $C_6 \rightarrow Z$, $C_5 \rightarrow Y$, $C_4 \rightarrow X$

PRESS: CONTINUE

DISPLAY

0	Z
0	Y
2	X

ENTER DATA: $C_9 \rightarrow Z$, $C_8 \rightarrow Y$, $C_7 \rightarrow X$

PRESS: CONTINUE

DISPLAY

0	Z
0	Y
3	X

ENTER DATA: $C_{12} \rightarrow Z$, $C_{11} \rightarrow Y$, $C_{10} \rightarrow X$

PRESS: CONTINUE

USER INSTRUCTIONS (Con't)

DISPLAY

0	Z
0	Y
4	X

ENTER DATA: $C_{15} \rightarrow Z$, $C_{14} \rightarrow Y$, $C_{13} \rightarrow X$

PRESS: CONTINUE

DISPLAY

0	Z
0	Y
5	X

ENTER DATA: $C_{16} \rightarrow Z$, P.V. (present value) $\rightarrow Y$
i or 0 $\rightarrow X$

PRESS: CONTINUE

DISPLAY

0	Z
$\lvert \Delta i \rvert$	Y
i%	X

To re-run with different i or P.V.

To re-run with different values of C, repeat USER INSTRUCTIONS

EXAMPLES

Example # 1

Present Value = $\$9.4 \times 10^6$ (Note: 10^6 is factored out of the basic equation as a constant.)

$C_1 = .55$
$C_2 = .34$
$C_3 = 1.20$
$C_4 = -.34$
$C_5 = .82$
$C_6 = -.57$
$C_7 = .76$
$C_8 = .76$
$C_9 = .76$
$C_{10} = .82$
$C_{11} = .82$

EXAMPLE (Con't)

$C_{12} = 1.00$
$C_{13} = 1.24$
$C_{14} = 1.35$
$C_{15} = 1.46$
$C_{16} = 0.00$

$i = 1.598\%$

Example #2

Present Value = $150.00

$C_1 = 100$
$C_2 = 100$

$i = 21.525\%$

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
0 0	CLEAR	20	ENTER		
(+) 1	STOP	41	C_1	C_2	C_3
2	x→( )	23			
3	d	17			
4	y→( )	40			
5	c	16			
6	↓	25			
7	y→( )	40			
8	b	14			
9	CLEAR	20			
a	1	01			
b	STOP	41	ENTER		
c	x→( )	23	C_4	C_5	C_6
d	a	13			
1 0	y→( )	40			
(+) 1	9	11			
2	↓	25			
3	y→( )	40			
4	8	10			
5	CLEAR	20			
6	2	02	ENTER		
7	STOP	41	C_7	C_8	C_9
8	x→( )	23			
9	7	07			
a	y→( )	40			
b	6	06			
c	↓	25			
d	y→( )	40			
2 0	5	05			
(+) 1	CLEAR	20			
2	3	03	ENTER		
3	STOP	41	C_{10}	C_{11}	C_{12}
4	x→( )	23			
5	4	04			
6	y→( )	40			
7	—	34			
8	f	15			
9	↓	25			
a	y→( )	40			
b	—	34			
c	e	12			
d	CLEAR	20			

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
3 0	4	04	ENTER		
(+) 1	STOP	41	C_{13}	C_{14}	C_{15}
2	x→( )	23			
3	0	00			
4	y→( )	40			
5	1	01			
6	↓	25			
7	y→( )	40			
8	2	02			
9	CLEAR	20			
a	GO TO ( )	44			
b	—	34			
c	0	00			
d	0	00	ENTER		
0 0	5	05	i	PV	C_{16}
(−) 1	STOP	41	i %	|Δi|	0
2	y→( )	40	DISPLAY		
3	e	12			
4	ROLL ↑	22			
5	x→( )	23			
6	3	03			
7	ENTER EXP	26			
8	2	02			
9	÷	35			
a	1	01			
b	+	33			
c	d	17			
d	↑	27			
1 0	↓	25			
(−) 1	GO TO ( )	44			
2	▲SUB▼	77			
3	a	13			
4	8	10			
5	c	16			
6	GO TO ( )	44			
7	▲SUB▼	77			
8	a	13			
9	8	10			
a	b	14			
b	GO TO ( )	44			
c	▲SUB▼	77			
d	a	13			

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
2 0	8	10			
(−) 1	a	13			
2	GO TO ( )	44			
3	▲SUB▼	77			
4	a	13			
5	8	10			
6	x←( )	67			
7	9	11			
8	GO TO ( )	44			
9	▲SUB▼	77			
a	a	13			
b	8	10			
c	x←( )	67			
d	8	10			
3 0	GO TO ( )	44			
(−) 1	▲SUB▼	77			
2	a	13			
3	8	10			
4	x←( )	67			
5	7	07			
6	GO TO ( )	44			
7	▲SUB▼	77			
8	a	13			
9	8	10			
a	x←( )	67			
b	6	06			
c	GO TO ( )	44			
d	▲SUB▼	77			

Storage

	+	−
f		
e	PV	C_{11}
d	C_1	C_{12}
c	C_2	
b	C_3	
a	C_4	
9	C_5	
8	C_6	
7	C_7	
6	C_8	
5	C_9	
4	C_{10}	
3	C_{16}	
2	C_{15}	
1	C_{14}	
0	C_{13}	

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
4 0	a	13			
(-) 1	8	10			
2	x←( )	67			
3	5	05			
4	GO TO ( )	44			
5	▲SUB▼	77			
6	a	13			
7	8	10			
8	x←( )	67			
9	4	04			
a	GO TO ( )	44			
b	▲SUB▼	77			
c	a	13			
d	8	10			
5 0	x←( )	67			
(-) 1	−	34			
2	f	15			
3	GO TO ( )	44			
4	▲SUB▼	77			
5	a	13			
6	8	10			
7	x←( )	67			
8	−	34			
9	e	12			
a	GO TO ( )	44			
b	▲SUB▼	77			
c	a	13			
d	8	10			
6 0	x←( )	67			
(-) 1	0	00			
2	GO TO ( )	44			
3	▲SUB▼	77			
4	a	13			
5	7	07			
6	x←( )	67			
7	1	01			
8	GO TO ( )	44			
9	▲SUB▼	77			
a	a	13			
b	8	10			
c	x←( )	67			
d	2	02			

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
7 0	GO TO ( )	44			
(-) 1	▲SUB▼	77			
2	a	13			
3	8	10			
4	x←( )	67			
5	3	03			
6	GO TO ( )	44			
7	▲SUB▼	77			
8	a	13			
9	8	10			
a	e	12			
b	↑	27			
c	x⇄y	30			
d	f	15			
8 0	x⇄y	30			
(-) 1	−	34			
2	÷	35			
3	9	11			
4	÷	35			
5	ROLL ↓	31			
6	+	33			
7	ROLL ↑	22			
8	ENTER EXP	26			
9	7	07			
a	CHG SIGN	32			
b	|y|	55			
c	IF x>y	53			
d	9	11			
9 0	8	10			
(-) 1	CLEAR x	37			
2	x→( )	23			
3	f	15			
4	ROLL ↓	31			
5	GO TO ( )	44			
6	0	00			
7	c	16			
8	x⇄y	30			
9	ROLL ↓	31			
a	1	01			
b	−	34			
c	ENTER EXP	26			
d	2	02			

HEWLETT·PACKARD

Step	Key	Code	Display x	Display y	Display z
a 0	×	36			
(-) 1	CLEAR x	37			
2	ROLL ↓	31			
3	CONT	47			
4	CONT	47			
5	GO TO ( )	44			
6	0	00			
7	1	01			
8	ROLL ↑	22			
9	÷	35			
a	x⇄y	30			
b	y⇄( )	24			
c	f	15			
d	+	33			
b 0	y⇄( )	24			
(-) 1	f	15			
2	x⇄y	30			
3	ROLL ↑	22			
4	×	36			
5	ROLL ↑	22			
6	RETURN	77			
7					
8					
9					
a					
b					
c					
d					

Storage	
f	
e	
d	
c	
b	
a	
9	
8	
7	
6	
5	
4	
3	
2	
1	
0	