

HEWLETT-PACKARD

Budgeting & Finance II

Business Software Solutions

SERIES 80

```
170
180
190
200
210 P
220 MOVE
230 FOR R
240 D=P*(N
    *FNF(N-R
250 PRINT R,I,
260 DRAW R,D
270 IDRAW 1,0
280 NEXT R
290 DRAW 11,0
300 DEF FNF(X)
310 F=1
320 FOR I=X TO 1 STEP -1
330 F=F*I
340 NEXT I
350 FNF=F
360 FN END
```

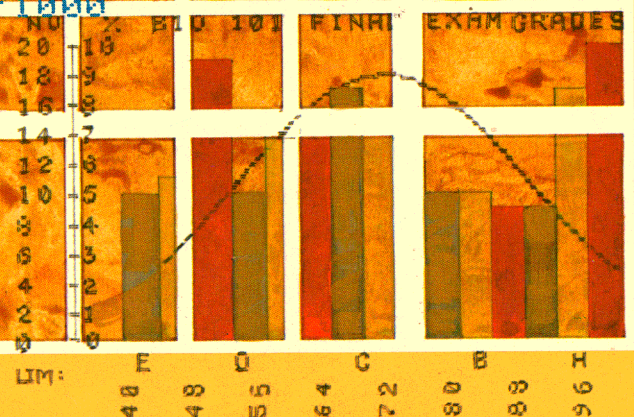


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PROGRAM DESCRIPTION I

Program Title Income Statement

File Name I N S T M T

Contributor's Name

Company (if applicable)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 5,170

Program Description: INSTMT prints a simple income statement and allows a sensitivity check on various input parameters.

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PROGRAM DESCRIPTION II**Sample Problem**

Amount of sales	: 1000	Growth rates (AVG or IND)	: AVG
Cost of goods sold	: 500	Growth in sales	: 10
Cost of advertising	: 150	Growth in cost of goods sold:	6
Administrative expense:	100	Growth in advertising	: 5
Tax loss carried fwd	: 50	Growth in Admin/Gen Expense	: 8

SOLUTION:

LOAD "INSTMT".
RUN.

Enter input parameters as requested.

INCOME STATEMENT**FISCAL YEAR 1980**

SALES	1000.00
- CG SOLD	500.00
- ADV	150.00
- ADM&GEN	100.00
= OPER INC	250.00
* TAX L.C.F.	50.00
- TAXES	89.50
= NET INCOME	160.50

FISCAL YEAR 1981

SALES	1100.00
- CG SOLD	530.00
- ADV	157.50
- ADM&GEN	108.00
= OPER INC	304.50
* TAX L.C.F.	0.00
- TAXES	139.66
= NET INCOME	164.84

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PROGRAM DESCRIPTION II

FISCAL YEAR 1982

SALES	1210.00
- CG SOLD	561.80
- ADV	165.38
- ADM&GEN	116.64
= OPER INC	366.19
* TAX L.C.F.	0.00
- TAXES	169.27
= NET INCOME	196.92

FISCAL YEAR 1983

SALES	1331.00
- CG SOLD	595.51
- ADV	173.64
- ADM&GEN	125.97
= OPER INC	435.88
* TAX L.C.F.	0.00
- TAXES	202.72
= NET INCOME	233.16

FISCAL YEAR 1984

SALES	1464.10
- CG SOLD	631.24
- ADV	182.33
- ADM&GEN	136.05
= OPER INC	514.49
* TAX L.C.F.	0.00
- TAXES	240.45
= NET INCOME	274.03

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PROGRAM DESCRIPTION III

Operating Limits and Warnings

Reference(s)

Variables:

Name	Description	Length	Comments
D(1)	Amount of sales		
D(2)	Cost of goods sold		
D(3)	Advertising expense		
D(4)	Administrative expense		
D(5)	Tax loss carried forward		
M(*1*)	Results		
P(*1*)	Growth rates		

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USER INSTRUCTIONS

STEP	INSTRUCTIONS
1	LOAD "INSTMT" and press RUN.
2	Enter input data as prompted.
3	Report will be printed.
4	Program menu:
4a	GROW - Prints a table of growth rates.
4b	PERCENT - Prints a table of percentage of items listed to sales.
4c	CHANGE - Go to Step 5.
4d	END - Ends program.
5	Change menu:
5a	SALES - Enter new growth rate in sales for particular year.
5b	CGS - Enter new growth rate for cost of goods sold.
5c	ADV - Enter new growth rate for advertising expenses.
5d	ADMIN - Enter new growth rate for administrative expenses.
5e	COMPUTE - Print report using current data.
5f	LAST - Returns program to Step 4.

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PROGRAM LISTING

Listing

Comments

```

10 CLEAR
20 DIM M(8,6),P(5,4),D(8)
30 DEF FNA(X) = INT((X*1000+5)/
  10)/100
40 DEF FNB(X) = FNA((X-1)*100)
50 FOR I=1 TO 8 @ FOR J=1 TO 5
  @ M(I,J)=0 @ NEXT J @ NEXT I
60 DISP "ENTER DATA FOR THE BAS
  E YEAR:"
70 DISP @ DISP "AMOUNT OF SALES
  ";
80 INPUT D(1)
90 DISP @ DISP "COST OF GOODS S
  OLD";
100 INPUT D(2)
110 DISP @ DISP "COST OF ADVERTI
  SING";
120 INPUT D(3)
130 DISP @ DISP "ADMINISTRATIVE
  EXPENSE";
140 INPUT D(4)
150 DISP @ DISP "TAX LOSS CARRIE
  D FORWARD";
160 INPUT D(5)
170 CLEAR
180 DISP "DO YOU WISH TO USE AVE
  RAGE OR    INDIVIDUAL GROWTH
  RATES?    ENTER 'AVG' OR
  'IND'";
190 INPUT Q$
200 IF Q$<>"AVG" AND Q$<>"IND" T
  HEN 170 ELSE CLEAR
210 IF Q$="IND" THEN 370
220 DISP "ENTER GROWTH IN SALES"
  ;
230 INPUT P(1,1)
240 DISP @ DISP "ENTER GROWTH IN
  COST OF GOODS    SOLD";
250 INPUT P(2,1)
260 DISP @ DISP "ENTER GROWTH IN
  ADVERTISING";
270 INPUT P(3,1)
280 DISP @ DISP "ENTER GROWTH IN
  ADMINISTRATIVEAND GENERAL
  EXPENSES";
290 INPUT P(4,1)
300 FOR I=2 TO 4
310 P(1,I)=P(1,1)
320 P(2,I)=P(2,1)
330 P(3,I)=P(3,1)
340 P(4,I)=P(4,1)
350 NEXT I
360 GOTO 470
370 FOR I=1980 TO 1983
380 DISP @ DISP "ENTER GROWTH IN
  SALES FOR";I;
390 INPUT P(1,I-1979)
400 DISP @ DISP "ENTER GROWTH IN
  COST OF GOODS    SOLD FOR";I

```

Data entry

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PROGRAM LISTING

Listing

Comments

```

410 INPUT P(2,I-1979)
420 DISP @ DISP "ENTER GROWTH IN
      ADVERTISING      FOR";I;
430 INPUT P(3,I-1979)
440 DISP @ DISP "ENTER GROWTH IN
      ADMINISTRATIVE AND GENERAL
      EXPENSES FOR";I;
450 INPUT P(4,I-1979)
460 CLEAR @ NEXT I
470 CLEAR @ FOR I=1 TO 4 @ FOR J
      =1 TO 4 @ P(I,J)=P(I,J)/100+
      1 @ NEXT J @ NEXT I
480 FOR I=1 TO 4 @ M(I,1)=D(I) @
      NEXT I @ M(6,1)=D(5)
490 FOR I=1 TO 4 @ FOR J=1 TO 4
500 M(I,J+1)=M(I,J)*P(I,J)
510 NEXT J @ NEXT I
520 FOR I=1 TO 5
530 M(5,I)=M(1,I)-M(2,I)-M(3,I)-
      M(4,I) @ NEXT I
540 FOR J=1 TO 5
550 IF M(5,J)>0 THEN 600
560 M(6,J+1)=-1*M(5,J)+M(6,J)
570 M(7,J)=0
580 M(8,J)=M(5,J)
590 GOTO 710
600 IF M(6,J)>M(5,J) THEN 620
610 GOTO 660
620 M(6,J+1)=M(6,J)-M(5,J)
630 M(7,J)=0
640 M(8,J)=M(5,J)
650 GOTO 710
660 IF M(5,J)-M(6,J)-25>0 THEN 6
      90
670 M(7,J)=(M(5,J)-M(6,J))* .22
680 GOTO 700
690 M(7,J)=(M(5,J)-M(6,J)-25)* .4
      8+5.5
700 M(8,J)=M(5,J)-M(7,J)
710 NEXT J
720 IMAGE "      SALES      ",60.00
730 IMAGE "      - CG SOLD  ",60.00
740 IMAGE "      - ADV      ",60.00
750 IMAGE "      - ADM&GEN   ",60.00
760 IMAGE "      = OPER INC  ",60.00
770 IMAGE "      * TAX L.C.F.",60.00
780 IMAGE "      - TAXES     ",60.00
790 IMAGE "      = NET INCOME",60.00
800 PRINT "      INCOME STATEME
      NT"
810 PRINT
820 FOR I=1 TO 5
830 PRINT "FISCAL YEAR";I+1979
840 PRINT
850 PRINT USING 720 ; FNA(M(1,I)
      )
860 PRINT USING 730 ; FNA(M(2,I)
      )
870 PRINT USING 740 ; FNA(M(3,I)
      )

```

Compute

Print report

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PROGRAM LISTING

Listing

Comments

```

880 PRINT USING 750 ; FNA(M(4,I)
)
890 PRINT USING 760 ; FNA(M(5,I)
)
900 PRINT USING 770 ; FNA(M(6,I)
)
910 PRINT USING 780 ; FNA(M(7,I)
)
920 PRINT USING 790 ; FNA(M(8,I)
)
930 PRINT
940 PRINT "-----"
-----"
950 PRINT @ NEXT I
960 ON KEY# 1,"GROW" GOTO 1030
970 ON KEY# 2,"PERCENT" GOTO 113
0
980 ON KEY# 3," CHANGE" GOTO 12
90
990 ON KEY# 4," END" GOTO 15
00
1000 OFF KEY# 5 @ OFF KEY# 8
1010 CLEAR @ KEY LABEL @ DISP "
SELECT OPTION:"
1020 GOTO 1020
1030 IMAGE 7A,4(2X,4D)
1040 PRINT " GROWTH RATE
S"
1050 PRINT
1060 PRINT USING 1030 ; " ",1981
,1982,1983,1984
1070 PRINT
1080 PRINT USING 1030 ; " SALES
",FNB(P(1,1)),FNB(P(1,2)),F
NB(P(1,3)),FNB(P(1,4))
1090 PRINT USING 1030 ; " CGS
",FNB(P(2,1)),FNB(P(2,2)),F
NB(P(2,3)),FNB(P(2,4))
1100 PRINT USING 1030 ; " ADV
",FNB(P(3,1)),FNB(P(3,2)),F
NB(P(3,3)),FNB(P(3,4))
1110 PRINT USING 1030 ; "ADM EXP
",FNB(P(4,1)),FNB(P(4,2)),F
NB(P(4,3)),FNB(P(4,4))
1120 PRINT @ PRINT @ GOTO 1010
1130 PRINT " PERCENT OF SAL
ES"
1140 PRINT @ PRINT
1150 FOR I=1 TO 5
1160 PRINT "FISCAL YEAR";I+1979
1170 PRINT
1180 PRINT USING 720 ; FNA(M(1,I)
)/M(1,I)*100)
1190 PRINT USING 730 ; FNA(M(2,I)
)/M(1,I)*100)
1200 PRINT USING 740 ; FNA(M(3,I)
)/M(1,I)*100)
1210 PRINT USING 750 ; FNA(M(4,I)
)/M(1,I)*100)
1220 PRINT USING 760 ; FNA(M(5,I)
)/M(1,I)*100)

```

Program menu

Print growth rates

Print percentages of sales

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PROGRAM LISTING

Listing

Comments

```

1230 PRINT USING 780 ; FNA(M(7,I
    )/M(1,I)*100)
1240 PRINT USING 790 ; FNA(M(8,I
    )/M(1,I)*100)
1250 PRINT
1260 PRINT "-----"
    "-----"
1270 PRINT @ NEXT I
1280 GOTO 1010
1290 ON KEY# 1,"SALES" GOTO 1400
1300 ON KEY# 2," CGS" GOTO 1410
1310 ON KEY# 3,"  ADV" GOTO 142
    0
1320 ON KEY# 4,"  ADMIN" GOTO 1
    430
1330 ON KEY# 5,"COMPUTE" GOTO 13
    70
1340 ON KEY# 8,"  LAST" GOTO 9
    60
1350 CLEAR @ KEY LABEL @ DISP "S
    ELECT CHANGE OPTION"
1360 GOTO 1360
1370 OFF KEY# 5
1380 OFF KEY# 8
1390 GOTO 480
1400 S1=1 @ GOTO 1440
1410 S1=2 @ GOTO 1440
1420 S1=3 @ GOTO 1440
1430 S1=4
1440 CLEAR @ DISP "ENTER YEAR NU
    MBER";@ INPUT T9
1450 T9=T9-1980
1460 IF T9<1 OR T9>4 THEN 1440
1470 DISP @ DISP "ENTER NEW PERC
    ENTAGE";
1480 INPUT S@ P(S1,T9)=S/100+1
1490 GOTO 1350
1500 CLEAR @ END

```

Change menu

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PROGRAM DESCRIPTION I

Program Title Mortgage Plan Comparison

File Name M C O S T

Contributor's Name

Company (if applicable)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 2,144

Program Description: MCOST permits the user to easily compare and evaluate up to 1000 mortgage payment plans simultaneously. The program computes monthly mortgage payments for various principal amounts at different interest rates over varying periods.

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PROGRAM DESCRIPTION II

Sample Problem

Compare two mortgages:

Number of principal amounts:	:	1
Amount 1	:	22000
Number of rates	:	2
Rate 1	:	7.5
Rate 2	:	8.0
Number of terms	:	2
Term 1	:	20
Term 2	:	25

SOLUTION:

LOAD "MCOST".
RUN.

Enter input data as prompted.

AMOUNT = 22000

RATE = 7.5

TERM= 20 YEARS
PAYMENT = 177.23
INTEREST = 20535.32

TERM= 25 YEARS
PAYMENT = 162.58
INTEREST = 26773.42
DEC MONTH PMT= 14.65
INC TOTAL INT= 6238.1

RATE = 8

TERM= 20 YEARS
PAYMENT = 184.02
INTEREST = 22164.04

TERM= 25 YEARS
PAYMENT = 169.8
INTEREST = 28939.87
DEC MONTH PMT= 14.22
INC TOTAL INT= 6775.83

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PROGRAM DESCRIPTION III

Operating Limits and Warnings

Reference(s)

Variables:

Name	Description	Length	Comments
A(*)	Principal Amounts		
R(*)	Rates		
T(*)	Terms		
P	Payment		
R4	Interest		

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USER INSTRUCTIONS

STEP**INSTRUCTIONS**

1 LOAD "MCOST" and press RUN.

2 Enter input data as prompted.

 NOTE: Rates are in percentages ($I > 1$, e.g. 7.5).

3 Results will be printed.

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PROGRAM LISTING

Listing

Comments

```

10 DIM A(36),R(36),T(36)
20 DEF FNA(X) = INT((X*1000+5)/
10)/100
30 CLEAR
40 DISP "ENTER NUMBER OF PRINCI
PAL      AMOUNTS";
50 INPUT A2
60 DISP @ DISP "ENTER THE AMOUN
TS:"
70 FOR X=1 TO A2
80 DISP "AMOUNT ";X;@ INPUT A(X
)
90 NEXT X
100 CLEAR
110 DISP "ENTER THE NUMBER OF RA
TES";
120 INPUT R2
130 DISP @ DISP "ENTER THE RATES
:"
140 FOR X=1 TO R2
150 DISP "RATE ";X;@ INPUT R(X)
160 NEXT X
170 CLEAR
180 DISP "ENTER THE NUMBER OF TE
RMS";
190 INPUT T2
200 DISP @ DISP "ENTER THE TERMS
:"
210 FOR X=1 TO T2
220 DISP "TERM ";X;@ INPUT T(X)
230 NEXT X
240 CLEAR
250 FOR A1=1 TO A2
260 PRINT "AMOUNT = ";FNA(A(A1))
270 PRINT
280 FOR R1=1 TO R2
290 PRINT "  RATE = ";FNA(R(R1))
300 PRINT
310 R5=0 @ P1=0
320 FOR T1=1 TO T2
330 PRINT TAB(6);"TERM= ";T(T1);
"YEARS"
340 N=12*T(T1)
350 R3=R(R1)/1200
360 P=A(A1)*R3/(1-1/(1+R3)^N)
370 R4=P*N-A(A1)
380 PRINT TAB(8);"PAYMENT = ";FN
A(P)
390 PRINT TAB(8);"INTEREST = ";F
NA(R4)
400 IF P1=0 THEN 420
410 PRINT TAB(8);"DEC MONTH PMT=
";FNA(P1-P)
420 IF R5=0 THEN 440
430 PRINT TAB(8);"INC TOTAL INT=
";FNA(R4-R5)
440 PRINT
450 R5=R4
460 P1=P
470 NEXT T1

```

Data entry

Amount loop

Rate loop

Term loop

Payment

Interest

Print report

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PROGRAM LISTING

Listing

Comments

```
480 PRINT
490 NEXT R1
500 PRINT "-----"
      "-----"
510 PRINT
520 NEXT R1
530 END
```

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION I

Program Title Capital Investment Analysis (Discounted Cash Flow Analysis)

File Name C A P D C F

Contributor's Name

Company (*if applicable*)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 12,841

Program Description: CAPDCF evaluates capital investment alternatives. Cash flows are determined and the rate of return is calculated using discounted cash flow analysis. An iterative technique is used to determine the rate of return rather than the trial and error technique.

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PROGRAM DESCRIPTION II

Sample Problem

Time period	:	Annual	Normal expenses	:	Yes
Investment amount	:	350000	Expense option	:	Uniform
Tax credit	:	24500	Uniform expense amount	:	99648
Salvage value	:	35000	Extraordinary expenses	:	Yes
Life of investment	:	12	# of extraordinary expenses	:	2
Income tax rate	:	50	Period number & amount 1	:	5,25000
Earnings option	:	Uniform	Period number & amount 2	:	10,25000
Single earning amount	:	184320	Depreciation option	:	S O Y D
Extraordinary earnings	:	Yes	Percent not depreciated	:	0
# extraordinary earnings	:	1	Number of years to deprec.	:	12
Period number & amount	:	12,35000			

SOLUTION:

LOAD "CAPDCF".
RUN.

Enter input data as requested.

RETURN = INVESTMENT IS 13.95%

CAPITAL INVESTMENT ANALYSIS

INVESTMENT COST	350000.00
SALVAGE VALUE	35000.00
INVESTMENT TAX CREDIT	24500.00
LIFE OF INVESTMENT	12.00
NET INVESTMENT COST	325500.00
INCOME TAX RATE	50.00

PERIOD 1

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	48461.54
TAXABLE INCOME	36210.46
INCOME TAX	18105.23
AFTER TAX CASH FLOW	66566.77
DISCOUNTED CASH FLOW	58417.34

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

PERIOD 2

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	44423.08
TAXABLE INCOME	40248.92
INCOME TAX	20124.46
AFTER TAX CASH FLOW	64547.54
DISCOUNTED CASH FLOW	49710.51

PERIOD 3

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	40384.62
TAXABLE INCOME	44287.38
INCOME TAX	22143.69
AFTER TAX CASH FLOW	62528.31
DISCOUNTED CASH FLOW	42260.00

PERIOD 4

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	36346.15
TAXABLE INCOME	48325.85
INCOME TAX	24162.92
AFTER TAX CASH FLOW	60509.08
DISCOUNTED CASH FLOW	35888.69

PERIOD 5

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	25000.00
BEFORE TAX CASH FLOW	59672.00

DEPRECIATION	32307.69
TAXABLE INCOME	27364.31
INCOME TAX	13682.15
AFTER TAX CASH FLOW	45989.85
DISCOUNTED CASH FLOW	23937.75

PERIOD 6

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	28269.23
TAXABLE INCOME	56402.77
INCOME TAX	28201.38
AFTER TAX CASH FLOW	56470.62
DISCOUNTED CASH FLOW	25794.56

PERIOD 7

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	24230.77
TAXABLE INCOME	60441.23
INCOME TAX	30220.62
AFTER TAX CASH FLOW	54451.38
DISCOUNTED CASH FLOW	21827.24

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

PERIOD 8

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	20192.31
TAXABLE INCOME	64479.69
INCOME TAX	32239.85
AFTER TAX CASH FLOW	52432.15
DISCOUNTED CASH FLOW	18444.71

PERIOD 9

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	16153.85
TAXABLE INCOME	68518.15
INCOME TAX	34259.08
AFTER TAX CASH FLOW	50412.92
DISCOUNTED CASH FLOW	15563.25

PERIOD 10

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	25000.00
BEFORE TAX CASH FLOW	59672.00

DEPRECIATION	12115.38
TAXABLE INCOME	47556.62
INCOME TAX	23778.31
AFTER TAX CASH FLOW	35893.69
DISCOUNTED CASH FLOW	9724.36

PERIOD 11

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	0.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	84672.00

DEPRECIATION	8076.92
TAXABLE INCOME	76595.08
INCOME TAX	38297.54
AFTER TAX CASH FLOW	46374.46
DISCOUNTED CASH FLOW	11025.69

PERIOD 12

NORMAL EARNINGS	184320.00
EXTRA EARNINGS	35000.00
NORMAL EXPENSES	99648.00
EXTRA EXPENSES	0.00
BEFORE TAX CASH FLOW	119672.00

DEPRECIATION	4038.46
TAXABLE INCOME	115633.54
INCOME TAX	57816.77
AFTER TAX CASH FLOW	61855.23
DISCOUNTED CASH FLOW	12905.88

TOTAL DISCOUNTED CASH	325500.00
INITIAL INVESTMENT	325500.00
NET PRESENT VALUE	.00

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION III

Variables:

Name	Description	Length	Comments
I1	Investment amount		
C1	Investment tax credit		
S1	Salvage value		
L1	Life of investment		
T1	Income tax rate		
E2	Earnings life in periods		
E3	Initial earnings		
E4	% of earnings to be final		
A(*)	Extra earnings by period		
X2	Expense life in periods		
X3	Initial expense		
X4	% of initial expense to be final		
Y(X)	Extra expenses by period		
D2	% of investment not to be depreciated		
D3	# of years to depreciate		
I	Period number		
E(*)	Normal earnings		
X(*)	Normal expenses		
B(*)	Before tax cash flow		
D(*)	Depreciation		
C(*)	Taxable income		
F(*)	Income tax		
G(*)	After tax cash flow		
H(*)	Discounted cash flow		
T2	Total discounted cash flow		

SERIES 80 USERS' LIBRARY
USER INSTRUCTIONS

STEP	INSTRUCTIONS
1	LOAD "CAPDCF" and press RUN.
2	Enter data as prompted.
3	Report will be printed.
4	Select program option:
4a	To enter new data, go to Step 2.
4b	To change current data, enter changes as prompted--then:
4c	Recompute using current data, then go to Step 4.
4d	End program.

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 CLEAR @ DISP "Setting up..."
20 DIM A(50),B(50),C(50),D(50),
  E(50),F(50),G(50),H(50),U(50),
  X(50),Y(50)
30 FOR X=1 TO 50
40 A(X),B(X),C(X),D(X),E(X),F(X),
  G(X),H(X),U(X),X(X),Y(X)=0
50 NEXT X
60 CLEAR @ DISP "      PERIOD OF
  TIONS:"
70 DISP @ DISP "      1) ANNUAL
  "
80 DISP "      2) SEMI-ANNUAL"
90 DISP "      3) QUARTERLY"
100 DISP "      4) MONTHLY"
105 DISP @ DISP
110 DISP "ENTER THE TIME PERIOD
  TO BE USED FOR CASH FLOWS AND
  LIFE";
120 INPUT K
130 K=(K=1)+2*(K=2)+4*(K=3)+5*(K
  =4)
140 CLEAR
150 DISP "INVESTMENT AMOUNT";
160 INPUT I1
170 DISP @ DISP "INVESTMENT TAX
  CREDIT";
180 INPUT C1
190 DISP @ DISP "SALVAGE VALUE";
200 INPUT S1
210 DISP @ DISP "LIFE OF INVESTM
  ENT";
220 INPUT L1
230 DISP @ DISP "INCOME TAX RATE
  ";
240 INPUT T1
250 GOSUB 7100
260 GOSUB 7300
270 CLEAR @ DISP "ANY EXTRAORDIN
  ARY EARNINGS";
280 GOSUB 7000
290 IF A=1 THEN GOSUB 7500
300 CLEAR @ DISP "ANY NORMAL EXP
  ENSES";
310 GOSUB 7000
320 IF A=1 THEN 340
330 X1=0
335 GOTO 360
340 GOSUB 7600
350 GOSUB 7800
360 CLEAR @ DISP "ANY EXTRAORDIN
  ARY EXPENSES";
370 GOSUB 7000
380 IF A=0 THEN 400
390 GOSUB 8000
400 GOSUB 8100
410 GOSUB 8300
4000 CLEAR @ DISP "Computing..."
4005 ON E1 GOTO 4180,4010,4050,4
  144

```

Housekeeping

Data entry

Compute

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

4010 FOR I=1 TO L1
4020 E(I)=E3
4030 NEXT I
4040 GOTO 4180
4050 E9=INT((E3-E4*.01*E3)/(E2-1
))
4060 FOR I=1 TO E2
4070 E(I)=E3-(I-1)*E9
4080 NEXT I
4090 GOTO 4180
4100 E4=E4*.01
4104 E0=E3*E4
4108 E(1)=E3
4112 FOR N=2 TO E2
4116 E(N)=E(N-1)-2*(E2-N+1)*(E3-
E0)/(E2*(E2-1))
4120 NEXT N
4140 GOTO 4180
4144 E4=E4*.01
4146 E0=E3*E4
4148 E(1)=E3
4152 FOR N=2 TO E2
4156 E(N)=E(N-1)-2*(N-1)*(E3-E0)
/(E2*(E2-1))
4159 NEXT N
4180 ON X1 GOTO 4360,4190,4230,4
280,4340
4182 IF X1=0 THEN 4360
4190 FOR I=1 TO L1
4200 X(I)=X3
4210 NEXT I
4220 GOTO 4360
4230 X9=INT((X3-X4*.01*X3)/(X2-1
))
4240 FOR I=1 TO X2
4250 X(I)=X3-(I-1)*X9
4260 NEXT I
4270 GOTO 4360
4280 X4=X4*.01
4283 X0=X3*X4
4286 X(1)=X3
4289 FOR N=2 TO X2
4291 X(N)=X(N-1)-2*(X2-N+1)*(X3-
X0)/(X2*(X2-1))
4294 NEXT N
4300 GOTO 4360
4340 X4=X4*.01
4343 X0=X3*X4
4346 X(1)=X3
4349 FOR N=2 TO X2
4352 X(N)=X(N-1)-2*(N-1)*(X3-X0)
/(X2*(X2-1))
4355 NEXT N
4360 ON D1 GOTO 4520,4370,4420,4
490
4370 D(1)=(1-D2*.01)*(I1-S1)/D3
4380 FOR N=2 TO D3
4390 D(N)=D(1)
4400 NEXT N
4410 GOTO 4520

```

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

4420 D4=I1-S1
4430 D5=(1-D2*.01)*D4
4440 FOR N=1 TO D3
4450 D(N)=D5*2/D3
4460 D5=D5-D(N)
4470 NEXT N
4480 GOTO 4520
4490 FOR N=1 TO D3
4500 D(N)=2/(D3*(D3+1))*(D3+1-N)
      *(1-D2*.01)*(I1-S1)
4510 NEXT N
4520 FOR I=1 TO L1
4530 B(I)=E(I)+A(I)-X(I)-Y(I)
4540 C(I)=B(I)-D(I)
4550 F(I)=C(I)*(1-T1*.01)
4560 G(I)=C(I)-F(I)+D(I)
4570 NEXT I
4580 U9=L1+1
4590 U(1)=-(I1-C1)
4600 FOR I=2 TO L1+1
4610 U(I)=G(I-1)
4620 NEXT I
4630 GOSUB 9000
4640 R=U
4650 FOR I=1 TO L1
4660 H(I)=G(I)/(1+R/100)^I
4670 NEXT I
4680 R=((1+R/100)^K-1)*100
5000 IMAGE "RETURN = INVESTMENT
      IS ",DDD.DD,"%",//
5010 PRINT USING 5000 ; R
5020 CLEAR @ DISP "DO YOU WISH A
      COMPLETE REPORT";
5030 GOSUB 7000
5040 IF A=0 THEN 5900
5050 PRINT " CAPITAL INVESTMENT
      ANALYSIS"
5060 PRINT " *****
      *****"
5070 PRINT @ PRINT
5080 IMAGE AAAAAAAAAAAAAAAAAAAAAA
      A,DDDDDD.DD
5090 PRINT USING 5080 ; "INVESTM
      ENT COST",I1
5100 PRINT USING 5080 ; "SALVAGE
      UALUE",S1
5110 PRINT USING 5080 ; "INVESTM
      ENT TAX CREDIT",C1
5120 PRINT USING 5080 ; "LIFE OF
      INVESTMENT",L1
5130 PRINT USING 5080 ; "NET INV
      ESTMENT COST",I1-C1
5140 PRINT USING 5080 ; "INCOME
      TAX RATE",T1
5150 PRINT @ PRINT
5160 PRINT "-----
      -----" @ PRINT @ PRI
      NT
5165 T2=0
5170 FOR I=1 TO L1

```

Report

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

5180 PRINT "PERIOD ";I
5190 PRINT "- - - - -"
5200 PRINT
5210 PRINT USING 5080 ; "NORMAL
    EARNINGS",E(I)
5220 PRINT USING 5080 ; "EXTRA E
    ARNINGS",A(I)
5230 PRINT USING 5080 ; "NORMAL
    EXPENSES",X(I)
5240 PRINT USING 5080 ; "EXTRA E
    XPENSES",Y(I)
5250 PRINT USING 5080 ; "BEFORE
    TAX CASH FLOW",B(I)
5260 PRINT @ PRINT
5270 PRINT USING 5080 ; "DEPRECI
    ATION",D(I)
5280 PRINT USING 5080 ; "TAXABLE
    INCOME",C(I)
5290 PRINT USING 5080 ; "INCOME
    TAX",F(I)
5300 PRINT USING 5080 ; "AFTER T
    AX CASH FLOW",G(I)
5310 PRINT USING 5080 ; "DISCOUN
    TED CASH FLOW",H(I)
5320 PRINT @ PRINT "-----"
    NT
5330 T2=T2+H(I)
5340 NEXT I
5350 PRINT
5360 PRINT USING 5080 ; "TOTAL D
    ISCOUNTED CASH FLOW",T2
5370 PRINT USING 5080 ; "INITIAL
    INVESTMENT",I1-C1
5380 PRINT USING 5080 ; "NET PRE
    SENT VALUE",T2-(I1-C1)
5390 PRINT
5400 !
5900 CLEAR @ DISP
5910 DISP "      PROGRAM OPTIONS:
    "
5920 DISP @ DISP "      1) ENTER
    NEW DATA"
5930 DISP "      2) CHANGE CURREN
    T DATA"
5935 DISP "      3) RE-COMPUTE"
5940 DISP "      4) QUIT"
5950 DISP @ DISP "      ENTER OPT
    ION";
5960 INPUT Q2
5970 ON Q2 GOTO 70,6000,4000,599
    0
5980 GOTO 5900
5990 CLEAR @ DISP "DONE" @ END
6000 CLEAR @ DISP "      CHANGE O
    PTIONS:" @ DISP
6010 DISP "      1) BASIC DATA"
6020 DISP "      2) EARNINGS DATA
    "
6030 DISP "      3) EXPENSE DATA"

```

Program options

Change options

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

6040 DISP "      4) DEPRECIATION
DATA"
6050 DISP "      5) EXIT"
6060 DISP @ DISP "      ENTER OPT
ION";
6070 INPUT Q2@ CLEAR
6080 ON Q2 GOTO 6110,6410,6520,6
640,5900
6090 GOTO 6000
6110 CLEAR @ DISP "      BASIC DA
TA OPTIONS:" @ DISP
6120 DISP "      1) INVESTMENT AM
OUNT"
6130 DISP "      2) INVESTMENT TA
X CREDIT"
6140 DISP "      3) SALVAGE VALUE
"
6150 DISP "      4) LIFE OF INVES
TMENT"
6160 DISP "      5) INCOME TAX RA
TE"
6170 DISP "      6) EXIT"
6180 DISP @ DISP "      ENTER OPT
ION";
6190 INPUT Q2@ CLEAR
6200 ON Q2 GOTO 6230,6260,6290,6
320,6350,6000
6210 GOTO 6110
6230 DISP "ENTER INVESTMENT AMOU
NT";
6240 INPUT I1@ GOTO 6700
6260 DISP "ENTER INVESTMENT TAX
CREDIT";
6270 INPUT C1@ GOTO 6700
6290 DISP "ENTER SALVAGE VALUE";
6300 INPUT S1@ GOTO 6700
6320 DISP "ENTER LIFE OF INVESTM
ENT";
6330 INPUT L1@ GOTO 6700
6350 DISP "ENTER INCOME TAX RATE
";
6360 INPUT T1
6370 GOTO 6110
6410 DISP "CHANGE EARNINGS OPTIO
N";
6420 GOSUB 7000
6430 IF A=0 THEN 6450
6440 GOSUB 7100
6450 GOSUB 7300
6460 CLEAR
6470 DISP "CHANGE EXTRAORDINARY
EARNINGS";
6480 GOSUB 7000
6490 IF A=0 THEN 6710
6500 GOSUB 7500
6510 GOTO 6710
6520 CLEAR
6530 DISP "CHANGE EXPENSE OPTION
S";
6540 GOSUB 7000

```

Basic data changes

Earnings & expense changes

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

6550 IF A=0 THEN 6570
6560 GOSUB 7600
6570 GOSUB 7800
6580 CLEAR
6590 DISP "CHANGE EXTRAORDINARY
      EXPENSES";
6600 GOSUB 7000
6610 IF A=0 THEN 6710
6620 GOSUB 8000
6630 GOTO 6710
6640 CLEAR
6650 DISP "CHANGE DEPRECIATION O
      PTION";
6660 GOSUB 7000
6670 IF A=0 THEN 6690
6680 GOSUB 8100
6690 GOSUB 8300
6700 CLEAR
6710 DISP "ANY MORE CHANGES";
6720 GOSUB 7000
6730 IF A=0 THEN 4000
6740 GOTO 6000
7000 INPUT Q$
7005 A=2
7010 IF Q$(1,1)="Y" THEN A=1
7020 IF Q$(1,1)="N" THEN A=0
7030 IF A#2 THEN RETURN
7040 BEEP @ DISP "Respond YES or
      NO please...";@ GOTO 7000
7100 CLEAR @ DISP "      EARNINGS
      OPTIONS:"
7110 DISP
7120 DISP "      1) ENTER EARNING
      S BY PERIOD"
7130 DISP "      2) UNIFORM EARNI
      NGS"
7140 DISP "      3) STRAIGHT LINE
      DECLINE"
7150 DISP "      4) EARLY RAPID D
      ECLINE"
7160 DISP "      5) LATER RAPID D
      ECLINE"
7165 DISP "      6) EXIT"
7170 DISP
7180 DISP "      ENTER OPTION";
7190 INPUT E1
7200 IF E1<1 OR E1>6 THEN 7100
7210 RETURN
7300 CLEAR @ ON E1 GOTO 7310,737
      0,7410,7410,7410,7470
7310 DISP "ENTER EARNINGS:" @ DI
      SP
7320 FOR I=1 TO L1
7330 DISP "PERIOD";I;
7340 INPUT E(I)
7350 NEXT I
7360 GOTO 7470
7370 DISP "ENTER SINGLE EARNING
      AMOUNT";
7380 E2,E4=0

```

Question response routine

Enter earnings data

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

7390 INPUT E3
7400 GOTO 7470
7410 DISP "ENTER EARNINGS LIFE I
      N YEARS";
7420 INPUT E2
7430 DISP @ DISP "ENTER INITIAL
      EARNINGS";
7440 INPUT E3
7450 DISP @ DISP "ENTER % OF INI
      TIAL VALUE TO      BE FINAL"
      ;
7460 INPUT E4@ E4=E4*.01
7470 RETURN
7480 !
7500 CLEAR @ DISP "ENTER NUMBER
      OF EXTRAORDINARY  EARNINGS
      ";
7510 INPUT E6
7520 DISP @ DISP "FOR EACH EARNI
      NG, ENTER PERIOD  NUMBER AN
      D AMOUNT:" @ DISP
7530 FOR I=1 TO E6
7540 DISP "EARNING #";I;
7550 INPUT E7,E8
7560 A(E7)=E8
7570 NEXT I
7580 RETURN
7600 CLEAR @ DISP "      EXPENSE
      OPTIONS:" @ DISP
7610 DISP "      1) ENTER EXPENSE
      S BY PERIOD"
7620 DISP "      2) UNIFORM EXPEN
      SES"
7630 DISP "      3) STRAIGHT LINE
      DECLINE"
7640 DISP "      4) EARLY RAPID D
      ECLINE"
7650 DISP "      5) LATER RAPID D
      ECLINE"
7660 DISP "      6) EXIT"
7670 DISP
7680 DISP "      ENTER OPTION";
7690 INPUT X1
7700 IF X1<1 OR X1>6 THEN 7600
7710 RETURN
7800 CLEAR @ ON X1 GOTO 7810,787
      0,7910,7910,7910,7970
7810 DISP "ENTER EXPENSES:" @ DI
      SP
7820 FOR I=1 TO L1
7830 DISP "PERIOD";I;
7840 INPUT X(I)
7850 NEXT I
7860 GOTO 7970
7870 DISP "ENTER UNIFORM EXPENSE
      AMOUNT";
7880 X2,X4=0
7890 INPUT X3
7900 GOTO 7970
7910 DISP "ENTER EXPENSE LIFE IN
      YEARS";

```

Enter expense data

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

7920 INPUT X2
7930 DISP @ DISP "INITIAL EXPENS
E";
7940 INPUT X3
7950 DISP @ DISP "ENTER % OF INI
TIAL EXPENSE TO BEFINAL VAL
UE";
7960 INPUT X4
7970 RETURN
8000 CLEAR @ DISP "ENTER NUMBER
OF EXTRAORDINARY EXPENSES
";
8010 INPUT X6
8020 DISP @ DISP "FOR EACH EXPEN
SE, ENTER PERIOD NUMBER AN
D AMOUNT:" @ DISP
8030 FOR I=1 TO X6
8040 DISP "EXPENSE #";I;
8050 INPUT X7,X8
8060 Y(X7)=X8
8070 NEXT I
8080 RETURN
8100 CLEAR @ DISP
8110 DISP "      DEPRECIATION OPT
IONS:"
8120 DISP "      1) EACH IS ENTER
ED"
8130 DISP "      2) STRAIGHT LINE
"
8140 DISP "      3) DECLINING BAL
ANCE"
8150 DISP "      4) SUM OF YEARS
DIGITS"
8160 DISP "      5) EXIT"
8170 DISP
8180 DISP "      ENTER OPTION";
8190 INPUT D1
8200 IF D1<1 OR D1>5 THEN 8100
8210 RETURN
8300 CLEAR @ IF D1=1 THEN 8370
8310 IF D1=5 THEN 8420
8320 DISP "ENTER % OF INVESTMENT
NOT TO BE DEPRECIATED";
8330 INPUT D2
8340 DISP @ DISP "ENTER NUMBER O
F YEARS TO      DEPRECIAT
E";
8350 INPUT D3
8360 GOTO 8420
8370 DISP "FOR EACH PERIOD, ENTE
R THE      DEPRECIATION:" @
DISP
8380 FOR I=1 TO L1
8390 DISP "PERIOD";I;
8400 INPUT D(I)
8410 NEXT I
8420 RETURN
9000 U=0
9010 U1,U2=0
9020 FOR U3=1 TO U9

```

Depreciation options

Discounting routine

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```
9030 U4=U(U3)*EXP(-U*(U3-1))
9040 U1=U1+U4
9050 U2=U2+(U3-1)*U4
9060 NEXT U3
9070 U=U+U1/U2
9080 IF ABS(U1/U2)>.00001 THEN 9
      010
9090 U=100*(EXP(U)-1)
9100 RETURN
```

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION I

Program Title Exponential Smoothing on Price Data

File Name E X S M O O

Contributor's Name

Company (if applicable)

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 8,569

Program Description: EXSM00 uses exponential smoothing to forecast data which is thought to have a trend and/or seasonal effect. Output is provided per period as a comparison between different methods of smoothing.

S_t = Actual demand in month t

$\bar{S}_t$ = Moving average of S_t after month t

a = Smoothing constant (0.1 - 0.2)

$S_t = C_1 + C_2 * t + C_3 * F_t + \text{error}$ $\left\{ \begin{array}{l} C_1 \text{ is the average coefficient} \\ C_2 \text{ is the trend coefficient} \\ C_3 \text{ is the seasonal coefficient} \end{array} \right.$

$\bar{S}_t = \bar{S}_{t-1} + a(S_t - \bar{S}_{t-1})$ $\left\{ \begin{array}{l} \text{Straight} \\ \text{New estimate} = \text{Old estimate} + a(\text{Actual}-\text{Old estimate}) \end{array} \right.$

$\bar{S}_t = (S_t / (F_t - L)) + (1-a) * \bar{S}_{t-1}$ $\left\{ \begin{array}{l} \text{Seasonality} \\ \text{where: } F_t = \beta(S_t / S_t) + (1-\beta) * (F_t - L) \text{ for next year} \\ L = \text{Number of periods in cycle} \end{array} \right.$

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SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II**Sample Problem**

Number of periods for which you have data : 30
 Number of periods used to initialize forecasting methods: 12
 Periodicity of the seasonal effect : 6
 Alpha for smoothing forecasts : .10
 Alpha for smoothing the seasonal effect : .20
 Alpha for the trend effect : .15
 Data for each period: 100, 75, 73, 72, 70, 60, 100, 90, 80, 70, 60,
 50, 110, 99, 85, 80, 75, 70, 105, 100, 95, 90, 85, 80, 110, 100, 75,
 70, 65, 60.

SOLUTION:

LOAD "EXSMO0".
 RUN.

Enter input data as prompted.

PERIOD 13

SALES: 110

EXPONENTIAL SMOOTHING WITH:

TREND 68.1

SEASONALS 98.83

TREND + SEASONALS 99.96

PERIOD 14

SALES: 99

EXPONENTIAL SMOOTHING WITH:

TREND 78.07

SEASONALS 77.61

TREND + SEASONALS 83.55

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

PERIOD 15

SALES: 85

EXPONENTIAL SMOOTHING WITH:

TREND 83.43

SEASONALS 75.97

TREND + SEASONALS 79

PERIOD 19

SALES: 105

EXPONENTIAL SMOOTHING WITH:

TREND 79.2

SEASONALS 108.98

TREND + SEASONALS 112.65

PERIOD 16

SALES: 80

EXPONENTIAL SMOOTHING WITH:

TREND 84.27

SEASONALS 74.1

TREND + SEASONALS 74.06

PERIOD 20

SALES: 100

EXPONENTIAL SMOOTHING WITH:

TREND 85.74

SEASONALS 86.64

TREND + SEASONALS 94.66

PERIOD 17

SALES: 75

EXPONENTIAL SMOOTHING WITH:

TREND 83.66

SEASONALS 71.16

TREND + SEASONALS 68.6

PERIOD 21

SALES: 95

EXPONENTIAL SMOOTHING WITH:

TREND 89.78

SEASONALS 81.64

TREND + SEASONALS 87.24

PERIOD 18

SALES: 70

EXPONENTIAL SMOOTHING WITH:

TREND 81.9

SEASONALS 61.21

TREND + SEASONALS 58.97

PERIOD 22

SALES: 90

EXPONENTIAL SMOOTHING WITH:

TREND 91.78

SEASONALS 79.44

TREND + SEASONALS 82.43

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

PERIOD 23

SALES: 85

EXPONENTIAL SMOOTHING WITH:

TREND 92.11

SEASONALS 76.35

TREND + SEASONALS 77.06

PERIOD 27

SALES: 75

EXPONENTIAL SMOOTHING WITH:

TREND 96.8

SEASONALS 89.12

TREND + SEASONALS 98.17

PERIOD 24

SALES: 80

EXPONENTIAL SMOOTHING WITH:

TREND 91.08

SEASONALS 67.09

TREND + SEASONALS 67.78

PERIOD 28

SALES: 70

EXPONENTIAL SMOOTHING WITH:

TREND 92.22

SEASONALS 83.53

TREND + SEASONALS 89.67

PERIOD 25

SALES: 110

EXPONENTIAL SMOOTHING WITH:

TREND 88.94

SEASONALS 116.27

TREND + SEASONALS 124.38

PERIOD 29

SALES: 65

EXPONENTIAL SMOOTHING WITH:

TREND 87.2

SEASONALS 77.68

TREND + SEASONALS 80.92

PERIOD 26

SALES: 100

EXPONENTIAL SMOOTHING WITH:

TREND 94.68

SEASONALS 95.43

TREND + SEASONALS 106.88

PERIOD 30

SALES: 60

EXPONENTIAL SMOOTHING WITH:

TREND 81.86

SEASONALS 67.3

TREND + SEASONALS 69.27

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

ABSOLUTE DEVIATIONS:

TREND	14.94
SEASONALS	10.08
TREND + SEASONALS	10.7

THEIL'S 'U' SQUARED:

TREND	.84
SEASONALS	.31
TREND + SEASONALS	.36

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION III

Operating Limits and Warnings The periodicity of the seasonal effect must be less than the number of periods used to initialize the forecasting methods.

Reference(s)

Variables:

Name	Description	Length	Comments
N1	Number of periods of data		
N2	Number of periods used to initialize forecasting methods		
N3	Seasonal effect periodicity		
A1	Alpha for smoothing forecasts		
A2	Alpha for smoothing seasonal effect		
A3	Alpha for trend effect		
S(*)	Sales data		
F(*)	Trend result		
G(*)	Seasonal result		
E(*)	Trend + seasonal result		
S2	Absolute deviation of trend		
S3	Absolute deviation of seasonals		
S1	Absolute deviation of seasonals + trend		
S5	Theil's 'U' squared for trend		
S6	Theil's 'U' squared for seasonals		
S4	Theil's 'U' squared for trend + seasonals		

SERIES 80 USERS' LIBRARY
USER INSTRUCTIONS

STEP**INSTRUCTIONS**

- 1 LOAD "EXSM00" and press RUN.
- 2 Enter input data as requested. (Computation may take up to 20 seconds, depending upon the number of periods entered.)
- 3 Results will be printed.

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 CLEAR
20 DIM C(86),E(86),F(86),G(86),
   R(86),S(86),T(86)
30 DEF FNA(X) = INT((X*1000+5)/
   10)/100
40 A=0
50 DISP "ENTER THE NUMBER OF PE
   RIODS FOR WHICH YOU HAVE DAT
   A";
60 INPUT N1
70 DISP @ DISP "ENTER NUMBER OF
   PERIODS USED TO INITIALIZE
   FORECASTING METHODS";
80 INPUT N2
90 DISP @ DISP "ENTER THE PERIO
   DICITY OF THE     SEASONAL EF
   FECT";
100 INPUT N3
110 DISP @ DISP "ENTER THE ALPHA
   FOR SMOOTHING     FORECASTS";
120 INPUT A1
130 DISP @ DISP "ENTER THE ALPHA
   FOR SMOOTHING     THE SEASONA
   L EFFECT";
140 INPUT A2
150 DISP @ DISP "ENTER THE ALPHA
   FOR THE TREND     EFFECT";
160 INPUT A3
170 CLEAR
180 DISP "ENTER THE DATA FOR EAC
   H PERIOD:"
190 DISP @ DISP
200 FOR I=1 TO N1
210 DISP "PERIOD ";I;
220 INPUT S(I)
230 NEXT I
240 CLEAR
250 FOR K=1 TO N2/N3
260 S1=0
270 FOR I=1 TO N3
280 S1=S1+S(I)
290 NEXT I
300 A(K)=S1/N3
310 NEXT K
320 T1=(A(N2/N3)-A(1))/(N2-N3)
330 B1=0
340 B2=1
350 FOR I=1 TO N2
360 B1=B1+1
370 R(I)=S(I)/(A(B2)-((N3+1)/2-B
   1)*T1)
380 IF B1>=N3 THEN B1=0 @ B2=B2+
   1
390 NEXT I
400 FOR I=1 TO N3
410 S1=0
420 FOR K=0 TO N2/N3-1
430 S1=S1+R(I+K*N3)
440 NEXT K
450 R(I)=S1/(N2/N3)

```

Data entry

Compute

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

460 NEXT I
470 S1=0
480 FOR I=1 TO N3 @ S1=S1+R(I) @
    NEXT I
490 FOR I=1 TO N3 @ R(I)=R(I)*(N
    3/S1) @ NEXT I
500 S(N1+2)=A(1)
510 C(N1+2)=A(1)
520 T(N1+2)=T1
530 FOR I=1 TO N1
540 IF I>N3 THEN N4=N3 ELSE N4=0
550 Z=I-1
560 IF Z<=0 THEN Z=N1+2
570 C(I)=A1*(S(I)/R(I-N4))+(1-A1
    )*(C(Z)+T(Z))
580 R(I)=A2*(S(I)/C(I))+(1-A2)*R
    (I-N4)
590 T(I)=A3*(C(I)-C(Z))+(1-A3)*T
    (Z)
600 E(I+1)=(C(I)+T(I))*R(I-N4+1)
610 NEXT I
620 FOR I=1 TO N1
630 Z=I-1
640 IF Z<=0 THEN Z=N1+2
650 C(I)=A1*S(I)+(1-A1)*(C(Z)+T(
    Z))
660 T(I)=A3*(S(I)-S(Z))+(1-A3)*T
    (Z)
670 F(I+1)=C(I)+T(I)
680 NEXT I
690 S1=0
700 FOR I=1 TO N3 @ S1=S1+S(I) @
    NEXT I
710 FOR I=1 TO N3 @ R(I)=N3*S(I)
    /S1 @ NEXT I
720 FOR I=1 TO N1
730 IF I>N3 THEN N4=N3 ELSE N4=0
740 Z=I-1
750 IF Z<=0 THEN Z=N1+2
760 C(I)=A1*(S(I)/R(I-N4))+(1-A1
    )*C(Z)
770 R(I)=A2*(S(I)/C(I))+(1-A2)*R
    (I-N4)
780 G(I+1)=C(I)*R(I-N4+1)
790 NEXT I
800 S1=0 @ S2=0 @ S3=0 @ S4=0
810 S5=0 @ S6=0 @ S7=0
820 FOR I=N2+1 TO N1
830 S1=S1+ABS(S(I)-E(I))
840 S2=S2+ABS(S(I)-F(I))
850 S3=S3+ABS(S(I)-G(I))
860 S7=S7+(S(I)-S(I-1))^2
870 S4=S4+(E(I)-S(I-1)-(S(I)-S(I
    -1)))^2
880 S5=S5+(F(I)-S(I-1)-(S(I)-S(I
    -1)))^2
890 S6=S6+(G(I)-S(I-1)-(S(I)-S(I
    -1)))^2
900 NEXT I
910 S1=S1/(N1-N2)

```

Trends + seasonals

Trend

Seasonal

Deviations

Theil's 'U' squared

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

920 S2=S2/(N1-N2)
930 S3=S3/(N1-N2)
940 S4=S4/S7 @ S5=S5/S7 @ S6=S6/
    S7
950 FOR I=N2+1 TO N1
960 PRINT
970 PRINT "PERIOD ";I
980 PRINT
990 PRINT "    SALES: ";S(I)
1000 PRINT
1010 PRINT "    EXPONENTIAL SMOOT
    HING WITH:"
1020 PRINT
1030 PRINT "    TREND";TAB(21)
    ;FNA(F(I))
1040 PRINT
1050 PRINT "    SEASONALS";TAB
    (21);FNA(G(I))
1060 PRINT
1070 PRINT " TREND + SEASONALS";
    TAB(21);FNA(E(I))
1080 PRINT
1090 PRINT "-----
    -----"
1100 NEXT I
1110 PRINT @ PRINT
1120 PRINT "    ABSOLUTE DEVIATION
    S:"
1130 PRINT
1140 PRINT "    TREND";TAB(21)
    ;FNA(S2)
1150 PRINT
1160 PRINT "    SEASONALS";TAB
    (21);FNA(S3)
1170 PRINT
1180 PRINT " TREND + SEASONALS";
    TAB(21);FNA(S1)
1190 PRINT
1200 PRINT "-----
    -----"
1210 PRINT "    THEIL'S 'U' SQUARE
    D:"
1220 PRINT
1230 PRINT "    TREND";TAB(21)
    ;FNA(S5)
1240 PRINT
1250 PRINT "    SEASONALS";TAB
    (21);FNA(S6)
1260 PRINT
1270 PRINT " TREND + SEASONALS";
    TAB(21);FNA(S4)
1280 PRINT @ PRINT
1290 END

```

Period reports

Final reports

SERIES 80 USERS' LIBRARY
PROGRAM DESCRIPTION I

Program Title Cash Flow Analysis

File Name C F L O W

Contributor's Name

Company (if applicable)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 8,245

Program Description: CFLOW calculates: 1) Present value of up to four cash flows for a given cost of capital; 2) Implicit rate of return which equates the present value of the cash flow to zero; and 3) Period in which payback occurs if applicable.

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SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

Sample Problem

Estimated cost of capital : 15%
 Number of periods : 5
 Number of flows considered: 4

Period	Flow 1	Flow 2	Flow 3	Flow 4
0	-100	-100	-100	-100
1	50	40	30	20
2	40	30	20	10
3	30	20	10	50
4	20	10	50	40
5	10	50	40	30

SOLUTION:

LOAD "CFLOW".
 RUN.

Enter input data as prompted.

*** FLOW 1

PAYBACK FOR INITIAL INVESTMENT
 IS IN PERIOD 4

PRESENT VALUE = 9.86

RATE OF RETURN EQUATING P.V. OF
 FLOW TO ZERO IS 20.27 %

*** FLOW 2

PAYBACK FOR INITIAL INVESTMENT
 IS IN PERIOD 5

PRESENT VALUE = 1.19

RATE OF RETURN EQUATING P.V. OF
 FLOW TO ZERO IS 15.52 %

*** FLOW 3

PRESENT VALUE = -3.74

RATE OF RETURN EQUATING P.V. OF
 FLOW TO ZERO IS 13.56 %

*** FLOW 4

PRESENT VALUE = -4.39

RATE OF RETURN EQUATING P.V. OF
 FLOW TO ZERO IS 13.36 %

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION III

Operating Limits and Warnings Number of periods must be less than 120.

Reference(s)

Variables:

Name	Description	Length	Comments
R	Cost of capital (%)		
N	Number of periods		
F	Number of flows		
D(*)	Income data		
I	Period number		
P3	Present value		
C	Rate of return		

SERIES 80 USERS' LIBRARY

USER INSTRUCTIONS

STEP	INSTRUCTIONS
-------------	---------------------

- | | |
|---|-------------------------------|
| 1 | LOAD "CFLOW" and press RUN. |
| 2 | Enter input data as prompted. |
| 3 | Results will be printed. |

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 DIM B(121),D(5,121)
20 CLEAR
30 DEF FNA(X) = INT((X*1000+5)/
10)/100
40 DISP "ENTER THE ESTIMATED CO
ST OF          CAPITAL IN PERCENT
";
50 INPUT R@ R=ABS(R/100)
60 DISP @ DISP "ENTER THE NUMBE
R OF PERIODS";
70 INPUT N
80 DISP @ DISP "ENTER THE NUMBE
R OF FLOWS BEING CONSIDERED
(1-5)";
90 INPUT F
100 FOR F1=1 TO F
110 CLEAR @ DISP "  *** ENTRY FO
R FLOW ";F1;" ***"
120 DISP @ DISP
130 FOR I=0 TO N
140 DISP "PERIOD ";I;"INCOME";
150 INPUT D(F1,I)
160 NEXT I
170 NEXT F1
180 CLEAR
190 FOR F1=1 TO F
200 PRINT @ PRINT "*** FLOW ";F1
210 S1=0 @ S=0 @ P3=0 @ D=1
220 FOR I=0 TO N
230 S1=S1+D(F1,I)
240 B(I)=D(F1,I)
250 P3=P3+D(F1,I)/(R+1)^I
260 IF B(I)<0 THEN D=-1
270 IF S=1 THEN 320
280 IF P3<0 THEN 320
290 IF I=0 THEN 310
300 PRINT @ PRINT "PAYBACK FOR I
NITIAL INVESTMENT  IS IN PER
IOD ";I
310 S=1
320 NEXT I
330 PRINT @ PRINT "PRESENT VALUE
= ";FNA(P3)
340 IF D>0 THEN 470
350 C=0
360 P=0 @ Q=0
370 FOR T=0 TO N
380 P=P+B(T)*EXP(C*(-T))
390 Q=Q+T*B(T)*EXP(C*(-T))
400 NEXT T
410 C=C+P/Q
420 IF C<0 THEN PRINT @ PRINT "O
UTLAY EXCEEDS INCOME BY ";FN
A(-S1) @ GOTO 470
430 IF EXP(C)-1>10 THEN PRINT @
PRINT "RATE OF RETURN EXCEED
S 1000 %" @ GOTO 470
440 IF ABS(P/Q)>.00001 THEN 360
450 C=EXP(C)-1
460 PRINT @ PRINT "RATE OF RETUR
N EQUATING P.V. OF FLOW TO Z
ERO IS ";FNA(C*100);" %"

```

Data entry

Flow loop

Flow overhead

Period loop

Error traps

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```
470 PRINT "
-----"
480 NEXT F1
490 END
```

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION I

Program Title Compound Interest

File Name S A V I N G

Contributor's Name

Company (*if applicable*)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 792

Program Description: SAVING calculates the amount of money that would accumulate after N years at a given interest rate with an amount D added to the account at the beginning of the year.

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SERIES 80 USERS' LIBRARY
PROGRAM DESCRIPTION II

Sample Problem

Period of years : 7
Annual Interest rate : 8%
Number of times
compounded per year : 2
Initial investment : 1000
Amount added at the
beginning of each year: 150

SOLUTION:

LOAD "SAVING".
RUN.

Enter input data as prompted.

OF YEARS: 7
DOLLARS INVESTED: 1000
INTEREST RATE: 8 %
COMPOUNDED: 2 TIMES/YR
ADDING: \$ 150 /YR

TOTAL YIELD: \$ 2926.67

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION III**Operating Limits and Warnings****Reference(s)****Variables:**

Name	Description	Length	Comments
Y	Period in years		
A	Interest rate		
X	Number of times compounded per year		
L	Initial investment		
N	Amount added at beginning of each year		
S	Total yield		

SERIES 80 USERS' LIBRARY

USER INSTRUCTIONS

STEP	INSTRUCTIONS
-------------	---------------------

- | | |
|---|-------------------------------|
| 1 | LOAD "SAVING" and press RUN. |
| 2 | Enter input data as prompted. |
| 3 | Results will be printed. |

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 CLEAR
20 DISP "ENTER PERIOD OF YEARS"
30 INPUT Y
40 DISP @ DISP "ENTER ANNUAL IN
   TEREST RATE";
50 INPUT A
60 DISP @ DISP "ENTER NUMBER OF
   TIMES COMPOUNDEDPER YEAR";
70 INPUT X
80 DISP @ DISP "ENTER INITIAL I
   NVESTMENT";
90 INPUT L
100 DISP @ DISP "ENTER AMOUNT AD
   DED AT THE START OF EACH YEA
   R";
110 INPUT N
120 CLEAR
130 D=0
140 B=.01*A
150 S=L
160 FOR Z=1 TO Y
170 S=S+D
180 FOR W=1 TO X
190 S=S*(1+B/X)
200 NEXT W
210 D=N
220 NEXT Z
230 S=INT(S*100+.5)/100
240 PRINT "# OF YEARS:";TAB(18);
   Y
250 PRINT "DOLLARS INVESTED:";TA
   B(18);L
260 PRINT "INTEREST RATE:";TAB(1
   8);A;"%"
270 PRINT "COMPOUNDED: ";TAB(18)
   ;X;" TIMES/YR"
280 PRINT "ADDING:";TAB(17);"$";
   N;" /YR"
290 PRINT
300 PRINT "TOTAL YIELD:";TAB(17)
   ;"$";S
310 PRINT
320 END

```

Data entry

Compute

Print report

Print result

SERIES 80 USERS' LIBRARY
PROGRAM DESCRIPTION I

Program Title Lease Analysis as Determined by the Lessee

File Name L E S S E E

Contributor's Name

Company (if applicable)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 4,227

Program Description: LESSEE compares the advantages of leasing vs. purchasing equipment. Investment tax credit is considered and a cash flow table is available.

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SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

Sample Problem

Purchase price : 20000
 Tax rate : 50
 Interest rate : 5.5
 Opportunity rate : 15
 Monthly rent : 500
 Depreciable life : 10
 Salvage value for tax : 1000
 Expected salvage value: 2000
 Lease arrangement cost: 500
 Annual expense savings: 4000
 Lease length : 10
 Basic rental period : 10

SOLUTION:

LOAD "LESSEE".
 RUN.

Enter input data as requested.

INVESTMENT TAX CREDIT 1400.00

 YEAR 1

PAYMENT	6000.00
DEPRECIATION	3454.55
LOAN	1037.69
OPERATING FLOW DIFF'NCE	3500.00
BASIC CASH FLOW SAVING	1103.88
BASIC CASH FLOW DISC AT	1026.87

YEAR 2

PAYMENT	6000.00
DEPRECIATION	3109.09
LOAN	951.38
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	2969.76
BASIC CASH FLOW DISC AT	2390.54

YEAR 3

PAYMENT	6000.00
DEPRECIATION	2763.64
LOAN	860.27
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	3188.05
BASIC CASH FLOW DISC AT	2220.66

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

YEAR 4

PAYMENT	6000.00
DEPRECIATION	2418.18
LOAN	764.07
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	3408.87
BASIC CASH FLOW DISC AT	2054.71

YEAR 8

PAYMENT	6000.00
DEPRECIATION	1036.36
LOAN	322.58
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	4320.53
BASIC CASH FLOW DISC AT	1460.19

YEAR 5

PAYMENT	6000.00
DEPRECIATION	2072.73
LOAN	662.51
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	3632.38
BASIC CASH FLOW DISC AT	1894.59

YEAR 9

PAYMENT	6000.00
DEPRECIATION	690.91
LOAN	196.41
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	4556.34
BASIC CASH FLOW DISC AT	1332.52

YEAR 6

PAYMENT	6000.00
DEPRECIATION	1727.27
LOAN	555.29
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	3858.72
BASIC CASH FLOW DISC AT	1741.61

YEAR 10

PAYMENT	6000.00
DEPRECIATION	345.45
LOAN	63.20
OPERATING FLOW DIFF'NCE	2000.00
BASIC CASH FLOW SAVING	3295.67
BASIC CASH FLOW DISC AT	834.03

YEAR 7

PAYMENT	6000.00
DEPRECIATION	1381.82
LOAN	442.09
OPERATING FLOW DIFF'NCE	4000.00
BASIC CASH FLOW SAVING	4088.04
BASIC CASH FLOW DISC AT	1596.63

*** TOTALS:

PAYMENT	60000.00
DEPRECIATION	19000.00
LOAN	5855.49
OPERATING FLOW DIFF'NCE	37500.00
BASIC CASH FLOW SAVING	34422.26
BASIC CASH FLOW DISC AT	16552.36

FINANCIAL ADVANTAGE	-26411.81
OPERATING ADVANTAGE	16552.36
NET LEASE ADVANTAGE	-9859.45

SERIES 80 USERS' LIBRARY **PROGRAM DESCRIPTION III**

Operating Limits and Warnings

Variables:

Name	Description	Length	Comments
P	Purchase price		
T	Tax rate		
R1	Interest rate		
R2	Opportunity rate		
M	Monthly rent		
L	Depreciable life		
S1	Salvage value for tax		
S2	Expected salvage value		
E1	Lease arrangement cost		
E2	Annual expense savings		
Y	Lease length		
J	Basic rental period		
M	Payment		
C1	Investment tax credit		
D	Depreciation		
B3	Loan		
F	Operating flow difference		
C	Basic cash flow savings		
V1	Basic cash flow discount		
I1,I6	Totals		

SERIES 80 USERS' LIBRARY
USER INSTRUCTIONS

STEP	INSTRUCTIONS
1	LOAD "LESSEE" and press RUN.
2	Enter data as prompted. (Echo of input data will be printed.)
3	Report will be printed.
4a	To change input data, select options 1-12 and enter data as prompted.
4b	To re-compute using the new data, select option 13.
4c	To end the program, select option 14.

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 CLEAR
20 FOR I=1 TO 12 @ CLEAR
30 ON I GOSUB 1250,1270,1290,13
  10,1330,1350,1370,1390,1410,
  1430,1450,1470
40 NEXT I
50 CLEAR
60 IMAGE 23A,DDDDDD," YRS"
70 IMAGE 23A,DDDDDD.D,"% "
80 IMAGE 23A,DDDDDD.DD
90 FOR I=1 TO 12
100 ON I GOSUB 1490,1530,1550,15
  60,1570,1580,1500,1510,1520,
  1540,1590,1600
110 NEXT I
120 PRINT @ PRINT "-----"
  -----"
130 PRINT
140 GOSUB 370
150 CLEAR
160 DISP "Change: 1) PURCHASE PR
  ICE"
170 DISP "          2) TAX RATE"
180 DISP "          3) INTEREST RA
  TE"
190 DISP "          4) OPPORTUNITY
  RATE"
200 DISP "          5) MONTHLY REN
  T"
210 DISP "          6) DEPRECIABLE
  LIFE"
220 DISP "          7) SALVAGE FOR
  TAX"
230 DISP "          8) EXPECTED SA
  LVAGE"
240 DISP "          9) ARRANGING C
  OST"
250 DISP "         10) ANNUAL SAVI
  NGS"
260 DISP "         11) LEASE LENGT
  H"
270 DISP "         12) BASIC RENTA
  L PERIOD"
280 DISP " -or- 13) RE-COMPUTE"
290 DISP "         14) QUIT"
300 DISP "         ENTER OPTION";
310 INPUT 09@ CLEAR
320 ON 09 GOSUB 1250,1270,1290,1
  310,1330,1350,1370,1390,1410
  ,1430,1450,1470,370,1610
330 IF 09=13 THEN 360
340 PRINT "*** NEW DATA ***"
350 ON 09 GOSUB 1490,1500,1510,1
  520,1530,1540,1550,1560,1570
  ,1580,1590,1600 @ PRINT
360 GOTO 150
370 DISP "PRINT THE CASH FLOWS";
380 INPUT 0$
390 IF 0$[1,1]="Y" THEN F9=1 ELS
  E F9=-1

```

Data entry

Print input data

Compute and report

Alter input data

Select cash flow report

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

400 P=P9 @ GOSUB 1150
410 R4=(1+R1/2)^(1/6)-1
420 P1=M/R4*(1+R4-1/(1+R4)^(12*J
-1))
430 A1=P-P1
440 IF J=0 THEN 460
450 B2=M*P/P1
460 P2=P
470 D1=0
480 V2=0
490 M1=12*M
500 I1,I2,I3,I4,I5,I6=0
510 FOR K=1 TO Y
520 D=(P2-S1)*2*(L-K+1)/(L*(L+1)
)
530 IF D<=P2-S1-D1 THEN 550
540 D=P2-S1-D1
550 IF D>=0 THEN 570
560 D=0
570 D1=D1+D
580 B3=0
590 IF K>J THEN 660
600 FOR I=1 TO 12
610 B1=R4*(P-B2)
620 B3=B3+B1
630 B4=B2-B1
640 P=P-B4
650 NEXT I
660 F=E2
670 S3=-E2
680 IF K>1 THEN 720
690 F=E2-E1
700 S3=-F
710 GOTO 760
720 IF K<Y THEN 750
730 F=E2-S2
740 S3=S2-(P2-D1)-E2
750 C1=0
760 C=(M1+S3-D-B3)*T+F-C1
770 IF K<=J THEN 790
780 C=C-M1
790 V1=C/(1+R2/2)^(2*K-1)
800 V2=V2+V1
810 IF F9=-1 THEN 970
820 PRINT "YEAR ";K
830 PRINT
840 PRINT USING 80 ; "PAYMENT",M
1
850 PRINT USING 80 ; "DEPRECIATI
ON",D
860 PRINT USING 80 ; "LOAN",B3
870 PRINT USING 80 ; "OPERATING
FLOW DIFF'NCE",F
880 PRINT USING 80 ; "BASIC CASH
FLOW SAVING",C
890 PRINT USING 80 ; "BASIC CASH
FLOW DISC AT",V1
900 I1=I1+M1
910 I2=I2+D
920 I3=I3+B3

```

Cash flow report

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PROGRAM LISTING

Listing

Comments

```

930 I4=I4+F
940 I5=I5+C
950 I6=I6+V1
960 PRINT @ PRINT "-----
-----" @ PRINT
970 NEXT K
980 IF F9=-1 THEN 1080
990 PRINT "*** TOTALS:"
1000 PRINT
1010 PRINT USING 80 ; "PAYMENT",
I1
1020 PRINT USING 80 ; "DEPRECIAT
ION", I2
1030 PRINT USING 80 ; "LOAN", I3
1040 PRINT USING 80 ; "OPERATING
FLOW DIFF'NCE", I4
1050 PRINT USING 80 ; "BASIC CAS
H FLOW SAVINGS", I5
1060 PRINT USING 80 ; "BASIC CAS
H FLOW DISC AT", I6
1070 PRINT @ PRINT "-----
-----"
1080 PRINT
1090 PRINT USING 80 ; "FINANCIAL
ADVANTAGE", A1
1100 PRINT
1110 PRINT USING 80 ; "OPERATING
ADVANTAGE", V2
1120 PRINT
1130 PRINT USING 80 ; "NET LEASE
ADVANTAGE", A1+V2
1140 PRINT "-----
-----" @ RETURN
1150 C1=.07*P
1160 IF L>7 THEN 1220
1170 C1=2/3*C1
1180 IF L>5 THEN 1220
1190 C1=C1/2
1200 IF L>3 THEN 1220
1210 C1=0
1220 PRINT @ PRINT USING 80 ; "I
NVESTMENT TAX CREDIT", C1
1230 PRINT @ PRINT "-----
-----"
1240 RETURN
1250 DISP "ENTER PURCHASE PRICE"
;
1260 INPUT P9@ RETURN
1270 DISP "ENTER TAX RATE";
1280 INPUT T@ T=T/100 @ RETURN
1290 DISP "ENTER INTEREST RATE";
1300 INPUT R1@ R1=R1/100 @ RETUR
N
1310 DISP "ENTER OPPORTUNITY RAT
E";
1320 INPUT R2@ R2=R2/100 @ RETUR
N
1330 DISP "ENTER MONTHLY RENT";
1340 INPUT M@ RETURN
1350 DISP "ENTER DEPRECIABLE LIF
E";

```

Totals for report

Compute and print investment tax
credit

Entry routines

PROGRAM LISTING

Listing

Comments

```

1360 INPUT L@ RETURN
1370 DISP "ENTER SALVAGE VALUE F
      OR TAX";
1380 INPUT S1@ RETURN
1390 DISP "ENTER EXPECTED SALVAG
      E VALUE";
1400 INPUT S2@ RETURN
1410 DISP "ENTER COST OF ARRANGI
      NG LEASE";
1420 INPUT E1@ RETURN
1430 DISP "ENTER ANNUAL EXPENSE
      SAVING DUE TO LEASE";
1440 INPUT E2@ RETURN
1450 DISP "ENTER LEASE LENGTH";
1460 INPUT Y@ RETURN
1470 DISP "ENTER BASIC RENTAL PE
      RIOD";
1480 INPUT J@ RETURN
1490 PRINT USING 80 ; "PURCHASE
      PRICE",P9 @ RETURN
1500 PRINT USING 70 ; "TAX RATE"
      ,T*100 @ RETURN
1510 PRINT USING 70 ; "INTEREST
      RATE",R1*100 @ RETURN
1520 PRINT USING 70 ; "OPPORTUNI
      TY RATE",R2*100 @ RETURN
1530 PRINT USING 80 ; "MONTHLY R
      ENT",M @ RETURN
1540 PRINT USING 60 ; "DEPRECIAB
      LE LIFE",L @ RETURN
1550 PRINT USING 80 ; "SALVAGE V
      ALUE FOR TAX",S1 @ RETURN
1560 PRINT USING 80 ; "EXPECTED
      SALVAGE VALUE",S2 @ RETURN
1570 PRINT USING 80 ; "LEASE ARR
      ANGEEMENT COST",E1 @ RETURN
1580 PRINT USING 80 ; "ANNUAL EX
      PENSE SAVINGS",E2 @ RETURN
1590 PRINT USING 60 ; "LEASE LEN
      GTH",Y @ RETURN
1600 PRINT USING 60 ; "BASIC REN
      TAL PERIOD",J @ RETURN
1610 END

```

Output routines

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION I

Program Title Annuity Analysis

File Name A N N U I T

Contributor's Name

Company (*if applicable*)

Address

City

State/Country

Zip Code/Mail Code

Machine Size: 16K ☒ 32K ☐

Peripherals Required: none

ROMs Required: none

Number of Bytes: 4,171

Program Description: This program performs the calculations necessary for determining both payment and withdrawal annuities. Variables are as follows: N=number of periods, P=original amount, A=total amount at end of N periods, I=interest rate per period in percent, and R=amount of payment/withdrawal each period. For a payment annuity, you give any three of N, A, I, R, and find the fourth. For a withdrawal annuity, you give any three of N, P, I, R and find the fourth. For a loan or mortgage, use the withdrawal option.

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SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

Sample Problem

For withdrawal annuity, find the amount of payment per period given:

Number of periods = $N = 10$

Original principal amount = $P = 1000$

Interest rate/period = $I = 10\%$

SOLUTION:

LOAD "ANNUIT".
RUN.

Enter input data as prompted.
Select program option after 'R' is displayed.
(The following printout is option 5)

WITHDRAWAL EACH PERIOD=R=
162.75

PERIOD 0	
PRINCIPAL	1000.00
PERIOD 1	
PRINCIPAL	62.75
INTEREST	100.00
PRINCIPAL BALANCE	937.25
INTEREST TO DATE	100.00
PERIOD 2	
PRINCIPAL	69.02
INTEREST	93.73
PRINCIPAL BALANCE	868.23
INTEREST TO DATE	193.73
PERIOD 3	
PRINCIPAL	75.92
INTEREST	86.82
PRINCIPAL BALANCE	792.31
INTEREST TO DATE	280.55
PERIOD 4	
PRINCIPAL	83.51
INTEREST	79.23
PRINCIPAL BALANCE	708.80
INTEREST TO DATE	359.78

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION II

PERIOD 5	
PRINCIPAL	91.87
INTEREST	70.88
PRINCIPAL BALANCE	616.93
INTEREST TO DATE	430.66

PERIOD 6	
PRINCIPAL	101.05
INTEREST	61.69
PRINCIPAL BALANCE	515.88
INTEREST TO DATE	492.35

PERIOD 7	
PRINCIPAL	111.16
INTEREST	51.59
PRINCIPAL BALANCE	404.72
INTEREST TO DATE	543.94

PERIOD 8	
PRINCIPAL	122.27
INTEREST	40.47
PRINCIPAL BALANCE	282.45
INTEREST TO DATE	584.41

PERIOD 9	
PRINCIPAL	134.50
INTEREST	28.25
PRINCIPAL BALANCE	147.95
INTEREST TO DATE	612.66

PRINCIPAL	147.95
INTEREST	14.80
PRINCIPAL BALANCE	0.00
INTEREST TO DATE	627.46

SERIES 80 USERS' LIBRARY

PROGRAM DESCRIPTION III

Operating Limits and Warnings The answer does not account for any simple interest that might have been paid on deposits prior to the first compounding period.

Reference(s)

Variables:

Name	Description	Length	Comments
N1	Number of periods		
P1	Original principal amount		
A1	Total amount at end of N periods		
I1	Interest rate per period in percent		
R1	Amount of payment/withdrawal each period		
Y	Total interest paid		
A2	Principal per period		
B,C	Interest per period		
X9	Principal balance		

SERIES 80 USERS' LIBRARY

USER INSTRUCTIONS

STEP**INSTRUCTIONS**

- 1 LOAD "ANNUIT" and press RUN.
- 2 Enter input data as prompted.
- 3 After unknown amount is displayed, select option.
- 4 Results will be printed.

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

10 CLEAR
20 PRINT "DEFINITION OF VARIABLE:"
30 PRINT
40 PRINT "N = NUMBER OF PERIODS"
50 PRINT "A = AMOUNT LEFT AT END OF N PERIODS"
60 PRINT "I = INTEREST IN PERCENT / PERIOD"
70 PRINT "R = AMOUNT OF PAYMENT / PERIOD"
80 PRINT "P = ORIGINAL PRINCIPAL AMOUNT"
90 PRINT
100 PRINT
110 S=0
120 CLEAR
130 DEF FNA(X) = INT((1000*X+5)/10)/100
140 DISP "ENTER ANNUITY TYPE:"
150 DISP @ DISP "1) PAYMENT" @ DISP "2) WITHDRAWAL"
160 INPUT A
170 GOTO 220
180 IF A=1 THEN 210
190 A=1
200 GOTO 220
210 A=2
220 IF A=1 THEN 270
230 IF A=2 THEN 840
240 DISP
250 DISP "ANSWER 1 OR 2 PLEASE"
260 GOTO 140
270 IF S=1 THEN 320
280 DISP
290 DISP "WHICH VARIABLE IS UNKNOWN (1=N, 2=A, 3=I, 4=R)";
300 INPUT D
310 IF D<1 OR D>4 THEN 330
320 ON D GOTO 360,440,520,580
330 DISP
340 DISP "ANSWER 1,2,3, OR 4 PLEASE."
350 GOTO 280
360 DISP
370 DISP "WHAT ARE A,I, AND R";
380 INPUT A1,I1,R1
390 I1=I1/100
400 N1=LOG(A1*I1/R1+1)/LOG(1+I1)
410 DISP
420 PRINT "NUMBER OF PERIODS = N = ";FNA(N1)
430 GOTO 650
440 DISP
450 DISP "WHAT ARE N,I, AND R";
460 INPUT N1,I1,R1
470 I1=I1/100
480 A1=R1*((1+I1)^N1-1)/I1

```

Data entry

SERIES 80 USERS' LIBRARY

PROGRAM LISTING

Listing

Comments

```

490 DISP
500 PRINT "AMOUNT AT END OF ";N
   @ DISP "PERIODS A=";FNA(R1)
510 GOTO 650
520 DISP
530 DISP "WHAT ARE N,A, AND R";
540 INPUT N1,P1,R1
550 DISP
560 IF N1*R1>P1 THEN 2010
570 GOTO 1600
580 DISP
590 DISP "WHAT ARE N,A, AND I";
600 INPUT N1,A1,I1
610 I1=I1/100
620 R1=A1*I1/((1+I1)^(N1-1))
630 DISP
640 PRINT "PAYMENT EACH PERIOD =
   R=";FNA(R1)
650 CLEAR
660 DISP "   PROGRAM OPTIONS:"
670 DISP @ DISP "   1) NEW CASE
   , SAME TYPE"
680 DISP "   2) NEW CASE, ANOTH
   ER UNKNOWN"
690 DISP "   3) NEW CASE, OTHER
   ANNUITY"
700 DISP "   4) PRINT TOTAL INT
   EREST PAID"
710 DISP "   5) PRINT WITHDRAWA
   LS TABLE"
720 DISP "   6) END"
730 DISP "   ENTER OPTION";@ INP
   UT S
740 IF S=1 THEN 220
750 IF S=2 THEN 220
760 IF S=3 THEN 180
770 IF S=6 THEN 2030
780 IF A<>1 THEN 820
790 CLEAR
800 DISP "OPTION";S;"NOT APPLICA
   BLE TO PAY-" @ DISP "MENT AN
   NUITIES" @ DISP
810 GOTO 660
820 IF S=4 THEN 980
830 IF S=5 THEN 980
840 IF S=1 THEN 880
850 DISP
860 DISP "WHICH VARIABLE IS UNKN
   OWN      (1=N, 2=P, 3=I, 4=
   R)";
870 INPUT A1
880 IF A1<1 OR A1>4 THEN 850
890 ON A1 GOTO 900,1470,1550,191
   0
900 DISP
910 DISP "WHAT ARE P,I, AND R";
920 INPUT P1,I1,R1
930 I1=I1/100
940 N1=LOG(R1/(R1-P1*I1))/LOG(1+
   I1)

```

PROGRAM LISTING

Listing

Comments

```

950 DISP
960 PRINT "NUMBER OF PERIODS = N
    =";FNA(N)
970 GOTO 650
980 N1=N1+.00001
990 P2=INT(N1)-N1
1000 IF ABS(P2)>.00001 THEN 1030
1010 N1=N1-1
1020 GOTO 1040
1030 N1=INT(N1)
1040 P2=1
1050 IF S=4 THEN 1110
1060 IF S=5 THEN 1070
1070 P2=0
1080 PRINT "PERIOD 0"
1090 PRINT USING 1230 ; "PRINCIP
    AL",P1
1100 PRINT
1110 X=0
1120 X9=P1
1130 Y=0
1140 FOR S=1 TO N1
1150 A3=(R1-P1*I1)*(1+I1)^(S-1)
1160 A2=FNA(A3)
1170 C=R1-A3
1180 B=FNA(C)
1190 X=X+A3
1200 X9=X9-A3
1210 Y=FNA(Y+C)
1220 IF P2<>0 THEN 1290
1230 IMAGE 23A,6D,DD
1240 PRINT "PERIOD ";S
1250 PRINT USING 1230 ; "PRINCIP
    AL",A2
1260 PRINT USING 1230 ; "INTERES
    T",B
1270 PRINT USING 1230 ; "PRINCIP
    AL BALANCE",X9
1280 PRINT USING 1230 ; "INTERES
    T TO DATE",Y @ PRINT
1290 NEXT S
1300 S=N1+1
1310 A3=P1-X
1320 A2=FNA(A3)
1330 B1=I1*A3
1340 B=FNA(B1)
1350 X=X+A3
1360 X9=0
1370 Y=Y+B1
1380 IF P2=0 THEN 1420
1390 DISP
1400 PRINT "TOTAL INTEREST PAID=
    ";Y
1410 GOTO 650
1420 PRINT USING 1230 ; "PRINCIP
    AL",A2
1430 PRINT USING 1230 ; "INTERES
    T",B
1440 PRINT USING 1230 ; "PRINCIP
    AL BALANCE",X9

```

Print table

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PROGRAM LISTING

Listing

Comments

```

1450 PRINT USING 1230 ; "INTERES
      T TO DATE",Y
1460 GOTO 650
1470 DISP
1480 DISP "WHAT ARE N,I, AND R";
1490 INPUT N1,I1,R1
1500 I1=I1/100
1510 P1=R1*((1+I1)^N1-1)/(I1*(1+
      I1)^N1)
1520 DISP
1530 PRINT "ORIGINAL PRINCIPAL =
      ";P1
1540 GOTO 650
1550 DISP
1560 DISP "WHAT ARE N,P, AND R";
1570 INPUT N1,P1,R1
1580 DISP
1590 IF N1*R1<=P1 THEN 1990
1600 DISP
1610 I1=.1
1620 I2=0
1630 I3=1
1640 IF A<>1 THEN 1670
1650 P3=R1*((1+I1)^N1-1)/I1
1660 GOTO 1680
1670 P3=R1*((1+I1)^N1-1)/(I1*(1+
      I1)^N1)
1680 P4=ABS(P1-P3)
1690 IF P4>.001 THEN 1720
1700 PRINT "INTEREST RATE / PERI
      OD=";FNA(I1*100)
1710 GOTO 650
1720 IF P4/P1>.3 THEN 1830
1730 IF A=1 THEN 1760
1740 IF P3<P1 THEN 1800
1750 GOTO 1770
1760 IF P3>P1 THEN 1800
1770 I2=I1
1780 I1=(I1+I3)/2
1790 GOTO 1640
1800 I3=I1
1810 I1=(I1+I2)/2
1820 GOTO 1640
1830 IF A=1 THEN 1860
1840 IF P3<P1 THEN 1880
1850 GOTO 1770
1860 IF P3>P1 THEN 1880
1870 GOTO 1770
1880 I3=I1
1890 I1=(I1+I2)/4
1900 GOTO 1640
1910 DISP
1920 DISP "WHAT ARE N,P, AND I";
1930 INPUT N1,P1,I1
1940 I1=I1/100
1950 R1=P1*I1*(1+I1)^N1/((1+I1)^
      N1-1)
1960 DISP
1970 PRINT "WITHDRAWAL EACH PERI
      OD=R=";FNA(R1)

```

Data entry for withdrawal annuities

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PROGRAM LISTING

Listing

Comments

```
1980 GOTO 650
1990 DISP "THE PRINCIPAL P IS NO
      T RECOVERED I MUST BE POSITI
      VE"
2000 GOTO 1550
2010 DISP "AMOUNT PAID IN N*R NO
      T RECOVERED I MUST BE POSITI
      VE"
2020 GOTO 520
2030 CLEAR @ END
```

BUDGETING & FINANCE II

INCOME STATEMENT
MORTGAGE PLAN COMPARISON
CAPITAL INVESTMENT ANALYSIS (DISCOUNTED CASH FLOW)
EXPONENTIAL SMOOTHING ON PRICE DATA
CASH FLOW ANALYSIS
COMPOUND INTEREST
LEASE ANALYSIS AS DETERMINED BY THE LESSEE
ANNUITY ANALYSIS



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