HP-80
APPLICATION NOTES
PUBLISHED AS A SERVICE FOR USERS OF THE HP-80 FINANCIAL POCKET CALCULATOR

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ANNUITY DUE AND PRESENT VALUE

GENERAL

Data entry sequences for the HP-80 top row keys (n i PMT PV FV) were designed to be simplest for calculations involving ordinary annuities. The most common definition of ***ordinary annuity*** (sometimes called "payments in arrears") assumes that payment amounts are equal, that payment periods are equally spaced in time, and that these payments are made ***at the end*** of each period. However, by slightly modifying the standard key sequences, the HP-80 can be used for ***annuity due*** calculations (sometimes called "payments in advance") where equal payments are made ***at the beginning*** of equally spaced periods.

This issue of the HP-80 APPLICATION NOTES will be of assistance to the HP-80 user wishing to solve for ***present value, payment amount,*** number of ***payment periods,*** and ***interest rate*** in annuity due calculations.

The symbolic values listed below will be used to demonstrate the various keystroke sequences that follow.

A = number of payment periods in a year
B = number of years
C = annual interest rate or annual yield (expressed as a %)
D = payment amount
E = present value of a series of payments

FIND THE PRESENT VALUE OF A SERIES OF PAYMENTS

Keystrokes:

1. A STO SAVE ↑ B × n
2. C RCL ÷ STO i
3. D RCL % + PMT
4. PV ——————————→ E

Example:

The owner of a downtown parking lot has been able to achieve full occupancy and a 7% annual yield (C) by renting parking spaces for $40 (D) per month (A = 12), payable in advance. Some regular customers have expressed interest in renting their spaces on an annual basis. What minimum annual (B = 1) rent, also payable in advance, will maintain his 7% annual yield rate?

Procedure:

12 STO SAVE ↑ 1 × n 7 RCL ÷ STO i 40 RCL % + PMT PV ——→ 464.98
(he should charge $464.98 annually)

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FIND THE PERIODIC PAYMENT AMOUNT

Keystrokes:

1. A [STO] [SAVE ↑] B [×] [n]
2. C [RCL] [÷] [STO] [i]
3. 1 [RCL] [%] [+] E [x⇄y] [÷] [PV]
4. [PMT] ——→ D

Example:

The owner of a piece of equipment presently worth $70,000 (E) intends to lease the equipment for a 5 year period (B). He estimates that the equipment will have no salvage value at the end of the lease, and he desires a 7% annual yield (C). What should the quarterly payments (A = 4) be, assuming that payments are made at the beginning of each quarter?

Procedure:

4 [STO] [SAVE ↑] 5 [×] [n] 7 [RCL] [÷] [STO] [i] 1 [RCL] [%] [+] 70000
[x⇄y] [÷] [PV] [PMT] ——→ 4106.52
($4106.52 per quarter)

FIND THE NUMBER OF PERIODS

Keystrokes:

1. C [SAVE ↑] A [÷] [STO] [i]
2. D [RCL] [%] [+] [PMT]
3. E [PV]
4. [n] ——→ AxB

Example:

The owner of the equipment in the previous example feels that it would be better if the quarterly payments (A = 4) on the $70,000 (E) piece of equipment were $3,600 (D). How long would he have to lease the equipment if he still desires a 7% annual yield (C).

Procedure:

7 [SAVE ↑] 4 [÷] [STO] [i] 3600 [RCL] [%] [+] [PMT] 70000 [PV] [n] 23.47
(23.47 quarters)

4 [÷] ——→ 5.87
(almost 6 years)

FIND THE ANNUAL INTEREST RATE OR YIELD

Keystrokes:

1. A [SAVE ↑] B [×] 1 [−] [n]
2. D [SAVE ↑] [PMT]
3. E [x⇄y] [−] [PV]
4. [i] A [×] ——→ C

Example:

A term insurance policy may be paid in two ways. The policy holder may pay $1000 (E) at the beginning of each year (B = 1) or he may elect to make payments of $84.87 (D) at the beginning of each month (A = 12). What is the apparent annual interest rate the insurance company is using when converting from annual payments to monthly payments?

Procedure:

12 [SAVE ↑] 1 [×] 1 [−] [n] 84.87 [SAVE ↑] [PMT] 1000 [x⇄y] [−] [PV] [i] 12 [×] ——→ 4.01
(4.01%)