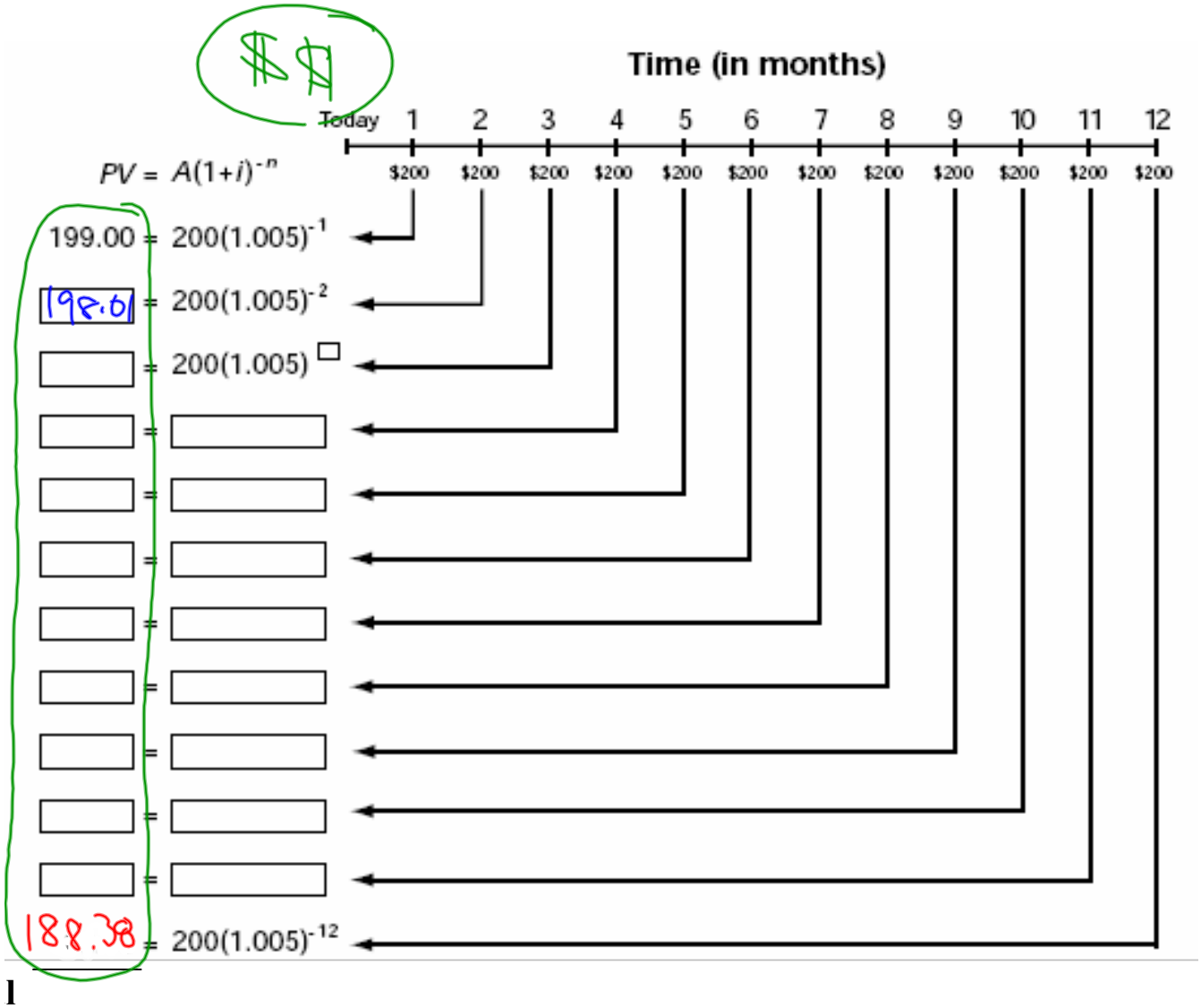
7.7 Present Value of an Ordinary Annuity

How much do you need to invest NOW to make regular payments….

Solve a PV Annuity Problem:

Method 1: Use a time line diagram $\$200 \times 12 \times 1 = 2400$

Holly must begin to repay her student loan. Her monthly payments of $200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?



Method 2: Use a Formula

Holly must begin to repay her student loan. Her monthly payments of $200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?

$$PV = \frac{R[1-(1+i)^{-n}]}{i}$$

$$= \frac{200[1-(1+0.005)^{-12}]}{0.005}$$

$PV = \$2323.79$

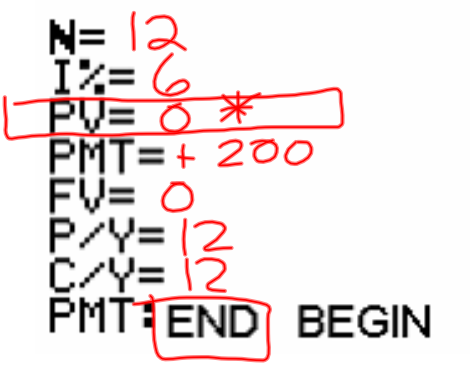
(compared to $2400 if she just paid the $200 every month)

PV is the present value in $
R is the regular payment
i is interest rate per period
n is total the number of deposits

$PV = ?$
$R = 200$
$i = 0.06 \div 12$
$= 0.005$
$n = 1 \times 12$

Method 3: Use a Graphing Calculator

Holly must begin to repay her student loan. Her monthly payments of $200 will be withdrawn at the end of each month from an account earning 6% interest compounded monthly. How much must she deposit in the account today so that loan payments can be made for one year?



PV=2323.79

Step 1: Press MODE and set the number of decimal places to 2:

Step 2: Press APPS 1 1 to open the TVM Solver:

Step 3: Enter the values of the variables as shown.

What the variables represent:

N (Number of Payments)
I% (Annual Interest Rate)
PV (Present Value)
PMT (Payment)
FV (Future Value)
P/Y (Number of Payments/Year)
C/Y (Number of Compounding Periods/Year)
PMT: END BEGIN (Payments at End of Payment Interval)

PV = 0.00 because it is the variable to be solved

PMT is negative because money is being paid out

FV = 0.00 because there will be no money in the account when the payments are finished

Ex 2. You are planning to buy a new car for $23 000. The dealership has offered you financing at 3.4%/annum, compounded monthly, for 5 years. Determine your monthly payment.

$PV = 23000$

$R = ?$

$i = 0.034 \div 12$

$\doteq 0.00283$

$n = 12 \times 5$

$$PV = \frac{R[1-(1+i)^{-n}]}{i}$$

$$23000 = \frac{R[1-(1+0.00283)^{-60}]}{0.00283}$$

$$23000(0.00283) = R[1-(1.00283)^{-60}]$$

$$\frac{6.509}{[1-(1.00283)^{-60}]} = \frac{R[1-(1.00283)^{-60}]}{[1-(1.00283)^{-60}]}$$

$$R = \$417.34$$

How much do we pay for car?

$417.34 \times 12 \times 5$

$= \$25040.40$

Ex. 3 You WIN Cash For Life....

5% comp weekly

(Which is actually just $1000 for 25 years)

a week

HOw much does the lottery have to invest today in order to pay you?

you win $1000 x 52 x 25
= $1 300 000

PV = ?
R = 1000
n = 52 x 25
i = 0.05 ÷ 52

N = 52 x 25
I = 5
PV = ? $741 856.01
PMT = 1000
FV = 0
P/Y = 52
C/Y = 52

HMWK:
p 506
2, 3b, 5 - 8, 11, 12, 18, 16*