Loan Payments

We have already studied how a loan with compound interest grows _____ with time if no payments are made and the interest rate does not change:

$$FV = P(1+r/n)^{nt} \quad \text{or} \quad Pe^{rt}$$

Note that in this case if we want to know how much we can afford to pay in the _____, we can also solve for the _____ that will grow to that amount:

$$P = FV/(1+r/n)^{nt} \quad \text{or} \quad P = FV/e^{rt}$$

The situation is more complicated if _____ are being made.

Example 2.4.3

- Can afford $200/month as car payment
- Auto loan: 3% APR for 5 years
- How expensive of a car loan can you afford? In other words, what amt. loan can you pay off with $200/month?

Note: If you pay $200/month for 5 years, that's

($200/month) × (_____) × (_____) = $_____

That will need to cover the _____ AND _____.
So certainly the loan amt must be _____ $_____.

What are we looking for here, PV or FV?

- Pair & Share

Since we are interested in the size of the loan ___ vs the total amt in the _____, we are looking for ___ or _____.

Calculate Principal / Present Value of Loan

... based on certain regular payments over a specified amt. of time, assuming a fixed interest rate

In Excel, enter the formula:

= PV(rate per period, # periods, paymt amt., FV)

- paymt amt.: d (paid every comp. period)
- rate per period: APR / (# times comp. per year) = r/n
- # periods: n·t = (# times comp/yr) · (# years)
- FV: future value (optional; 0 for loan)

See Excel Spreadsheet.

- Can afford loan of $_____.
- Total paid is $12,000.
- Amt paid in interest is $_____.

Calculate Amt. of Regular Payments

In Excel, enter the formula:

= PMT(rate per period, # periods, present val., future val.)

- present val.: principal: P
- rate per period: $\frac{APR}{\#\text{ times comp. per year}} = r/n$
- # periods: $(\#\text{ times comp/yr}) \cdot (\#\text{ years}) = n \cdot t$
- future val.: optional (enter 0 for loan)

Example 2.4.2 Buy car that costs $15,000; have $3,000 saved & will finance the rest (get $12,000 loan). Compare:

(a) 3 year loan at 2.75% APR

(b) 5 year loan at 4% APR

Monthly payments for each? Total paid for each? Amt. of interest?