Closing Tuesday: 6.3, 6.4

Closing Thursday: 6.5

Final exam is Saturday, December 10 5:00pm to 7:50pm in Kane Hall 130.

You have an assigned seat, see the first entry at the top of your grade report for your assigned seat.

R = amount of each regular payment

r = decimal interest rate

m = num. of compoundings in a year

Compute:

$i = \frac{r}{m}$ = rate at each compounding

$n = mt$ = total payments

	Ordinary (Payments at END of each period)	**Due** (Payments at BEGINNING of each period)
FV (Balance Growing)	$F = R\frac{(1+i)^n - 1}{i}$	$F = R\frac{(1+i)^n - 1}{i}(1+i)$
PV (Balance Shrinking)	$P = R\frac{1-(1+i)^{-n}}{i}$	$P = R\frac{1-(1+i)^{-n}}{i}(1+i)$

2. A company establishes a sinking fund to pay a debt of $100,000 due in 4 years. At the beginning of each six-month period, they deposit $R in an account paying 9%, compounded semi-annually. How big must the payments be to pay the debt on time?

Ordinary or Due? , FV or PV?

r = , m = , t =

i = , n = ,

R = , FV/PV =

3. Your retirement account earns 7%, compounded quarterly. How much must the account contain when you retire if you want to withdraw $6000 at the end of each quarter for 30 years?

Ordinary or Due? , FV or PV?

r = , m = , t =

i = , n = ,

R = , FV/PV =

4. You inherit $200,000 and invest it at 3%, compounded monthly. If you withdraw $1000 at the beginning of every month, how long will the money last?

Ordinary or Due? , FV or PV?

r = , m = , t =

i = , n = ,

R = , FV/PV =

Chapter 6 Summary

1. Are there regular payments?
   (a) NO: it's a LUMP SUM problem.
   (b) YES: it's an ANNUITY problem.

2(a) For LUMP SUM, does it say:
   (i) ``simple interest"?
   (ii) ``compound continuously"?
   (iii) ``compounded m times a year"

2(b) For ANNUITIES,
   (i) payments at BEGINNING or END?
   (ii) balance GROWING or SHRINKING?

Special notes on Annuities:

1. Always first compute
   $i = r/m$ = rate used at each period.
   $n = mt$ = total number of payments

2. Since
   R = payment amount, and
   n = total number of payments
we have
   $R \cdot n$ = total amount paid.

Thus, for FV questions
   Total interest earned = $F - R \cdot n$
and for PV questions
   Total interest paid = $R \cdot n - P$

3. Loans are present value, ordinary annuities. If there is a down payment on a loan, then
   P = original value – down payment

Homework Question 6.3 Problem 7(a)(b):

A small business owner contributes $2000 at the end of each quarter to a retirement account that earns 10% compounded quarterly.

(a) How long will it be until the account is worth $150,000?

(Round your answer to the nearest quarter.)

(b) Suppose when the account reaches $150,000, the business owner increases the contributions to $4000 at the end of each quarter. What will the total value of the account be after 15 more years?

(Old Final Question)

Immediately after graduating from college, Julian started a savings plan, depositing $200 at the end of each month in an account paying 3% interest, compounded monthly. After 6 years, Julian stopped making payments but left the money in the account, gaining interest at the same rate, for an additional 4 years.

(a) How much money is in the account in 6 years?

(b) How much money is in the account in 10 years?