

Closing Thurs: 6.5

Final Saturday, December 10

Time: 5:00-7:50pm

Location: Kane 130

My extended office hours

Wed, Fri: 9:00-9:30am in classroom

1:15-3:30pm in MSC

also today and tomorrow

MSC is open 12:30-4:30pm.

CLUE is open 7:00pm to midnight.

Rules:

1. Required to have a Ti-30X IIs calculator.
2. Allowed one 8.5 by 11 inch sheet of handwritten notes (front and back)
3. Allowed a ruler.
4. Bring your husky card or some other photo ID.

5. If you are extremely ill (in the emergency room) on the day of the exam, then you will have to petition the department for a make-up exam:

Here are the rules concerning sickness/make-ups from the math department:

“Petitions for make-up exams should be brought to Mathematics Advising Office, C-36 Padelford and should be filed by Friday, November 4. Petitions are usually granted only for religious reasons. Petitions are sometimes granted for reasons of health or extraordinary circumstances of grave personal import. In such cases the instructor should be contacted in advance and appropriate written documentation provided. Approval of petitions is not automatic. Plans for sporting events, travel or work on exam day, etc. do not constitute extraordinary circumstances. If another final conflicts with a Math Common Final, students are responsible for making arrangements to move their non-Math final”

6.5 Loans

A loan is an **ordinary** annuity from the bank's perspective; the bank invests a large **present value** in your home or car or education, and then withdraws payments, with interest, from you. We know this formula!

$$P = R \frac{1 - (1 + i)^{-n}}{i}$$

P = starting loan balance

R = loan payment

r = yearly rate,

m = compoundings/payments per year

$i = r/m$ = rate at each compounding

$n = mt$ = total payments

The process of repaying the principal and interest in equal payments is called amortization.

Example:

Sarah purchases a \$350,000 home with a down payment of \$75,000 and a mortgage loan for the rest at 5%, compounded monthly amortized over 30 years.

- (a) What is the starting loan balance?
- (b) What are the monthly payments?
- (c) What is the total amount Sarah pays for the house? (*i.e.* total over the “life of the loan”)
- (d) How much interest does she pay?

Don't need to write this down

Amortization (Payment) Schedule

for Sarah's example:

$$i = 0.05/12 = 0.004166\dots$$

For each monthly statement, the bank computes interest by multiplying i times the unpaid balance. That part of your payments is interest, the rest is subtracted from the principal

Month	Payment	Interest	Principal	Unpaid Balance
0				\$275,000.00
1	\$1,476.26	\$1,145.83	\$330.43	\$274,669.57
2	\$1,476.26	\$1,144.46	\$331.80	\$274,337.77
3	\$1,476.26	\$1,143.07	\$333.19	\$274,004.58
4	\$1,476.26	\$1,141.69	\$334.57	\$273,670.01
5	\$1,476.26	\$1,140.29	\$335.97	\$273,334.04
6	\$1,476.26	\$1,138.89	\$337.37	\$272,996.67
7	\$1,476.26	\$1,137.49	\$338.77	\$272,657.90

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. First compute
 - $i = r/m$ = rate used at each period.
 - $n = mt$ = total number of payments
2. Note:
 - $R \cdot n$ = total amount paid.For FV questions
$$\text{Total interest} = F - R \cdot n$$
For PV questions
$$\text{Total interest} = R \cdot n - P$$
3. Loans are present value, ordinary annuities. If there is a down payment on a loan, then
$$P = \text{original value} - \text{down payment}$$