

# MA111: Contemporary mathematics

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Entrance Slip (Show Your Work; due 5 min past the hour):

- Borrow \$100 at 10% per month interest, pay back at \$40 per month, how long does it take you to pay it all back?
- Borrow \$100 at 2% per month, pay \$2 per month, how long?

SCHEDULE:

- HW 10.2,10.3 is due Friday, Sep 28th, 2012.
- HW 10.6 is due Friday, Oct 5th, 2012.
- The second exam is Monday, Oct 8th, during class.

Today we will drill 10.3, compound interest (and sneakily start 10.6).

## Context: Practice on some more exam like problems

- “Which is the better deal?” problems are better done with your pencil and paper than with your time and money
- “How long does it take to pay back?” is also important to know before you borrow, not three years into the loan.
- \$100 at 10% per month interest, pay back at \$40 per month

End of first month, owe  $(\$100)(1.10) - \$40 = \$110 - \$40 = \$70$

End of second month, owe  $(\$70)(1.10) - \$40 = \$77 - \$40 = \$37$

End of third month, owe  $(\$37)(1.10) - \$40 = \$40.70 - \$40 = \$0.70$

Probably should just send the extra \$0.70 this month

- We'll start with a few review problems similar to the homework

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Value after 5 years?

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$$T = 5 \text{ years}$$

$$F = P(1 + p)^T = \$100(1 + 0.024)^5 = \$112.5899907 = \$112.59$$

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then 2.1% compound interest annually the next three years,  
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- \$100 Savings Account  
earning 2.4% compound interest annually the first two years,  
then 2.1% compound interest annually the next three years,  
Value after 5 years? \$111.60

$$F = \$100(1.024)(1.024)(1.021)(1.021)(1.021) = \$111.60$$

## Activity: Moving money and compound interest

- \$100 Savings Account  
earning 2.4% compound interest annually the first two years,  
then you deposit another \$100,  
then 2.4% compound interest annually the next three years,  
Value after 5 years?
- Use simple interest month-by-month to find the total amount
- Can you use compound interest to solve it?  
What if you had two banks,  
one that you put in \$100 at the beginning  
one that you put in \$100 after two years  
How much do you have total from the two accounts?

## Activity answers

- \$100 Savings Account  
earning 2.4% compound interest annually the first two years,  
then you deposit another \$100,  
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Value after 5 years?



## Activity answers

- \$100 Savings Account  
earning 2.4% compound interest annually the first two years,  
then you deposit another \$100,  
then 2.4% compound interest annually the next three years,  
Value after 5 years? \$219.97

<i>T</i>	<i>F</i> formula = <i>F</i> number
Now	\$100.00 = \$100.00
1st year	$(\$100.00)(1.024) = \$102.40$
2nd year	$(\$102.40)(1.024) = \$104.86$
deposit	$\$104.86 + 100 = \$204.86$
3rd year	$(\$204.86)(1.024) = \$209.78$
4th year	$(\$209.78)(1.024) = \$214.81$
5th year	$(\$214.81)(1.024) = \$219.97$

## Activity answers

- \$100 Savings Account  
earning 2.4% compound interest annually the first two years,  
then you deposit another \$100,  
then 2.4% compound interest annually the next three years,  
Value after 5 years? \$219.97 or \$219.96
  
- Faster is to think: \$100 was compounded 5 years,  
plus \$100 was compounded 3 years

$$F = \$100(1.024)^5 + \$100(1.024)^3 = \$219.9641731 = \$219.96$$

## Activity 2: Short installment loans

- Similar to the entrance slip:
- Borrow \$100 at 10% per month, and pay back \$22.96 at the end of each month
- How much do you owe after each month?
- When are you done paying it off?
- How much total did you end up paying?
- Is it better to pay \$100 now or the \$137.76 over six months?

## Fast: Applications of interest

- Simple interest is used over the course of a single period
- Compound interest is just repeated simple interest

For a changing interest rate, or just a few periods, use simple repeatedly

- Amortized loans, pay back a loan in equal payments

For just a few payments, just use compound repeatedly

- Monday we'll learn to use the fancy formulas for longer loans

Wednesday we'll go over consumer financial products

Friday we'll review for the exam

# Assignment and exit slip

- Book problems are decent: #1-4, 5-8, 9-10, 11-12, 13-18, 21-22, 23-24, 31-32, 33-36, 37-40, 41-42, 43-44, 45-46, 47-48, 49-50
- Ok, so #1-4, #21, #37, #41, #43, #45, #47, #49, #19 but use a current news article  
(one of the presidential candidates released his taxes recently; do his figures add up?)
- **Exit slip:** Which is cheaper:
  - A loan at 2% per month, compounded monthly, 60 months
  - A loan at 25% per year, compounded yearly, 5 years
  - A loan at 0.4% per week, compounded weekly, 260 weeks
- Do you need to take them out to five years or is one year enough?