Monday, December 03, 2012

- Today:
  1) Evaluations, 10-15 minutes.
  2) Final Exam Guidelines/Overview
  3) Review

- **Office hours: today 1:30-2 in CDH 109, 3:30-4in PDL C-326**
  Tomorrow: 10-11:30 in PDL C-326, 2:30-3:30 in MSC

- **HOMEWORK Sections 6.4 & 6.5 are due Tuesday night**.
  + Review for the final. Lots of info on class website:
  http://www.math.washington.edu/~nichifor/111F12.htm

EVALUATIONS:

Instructor's name: ALEXANDRA NICHIFOR

Class: Math 111

Section: C

Date: 12/3/2012

- This evaluation is confidential -- do not write your name and participation is voluntary -- answer only the questions you wish.

- A volunteer student will be collecting and mailing these forms. I will not see your comments until well into the next quarter.

- Please use a #2 pencil to fill in the bubbles on the white sheet. Extra pencils are available at front.

- Please stack the white and yellow forms in two separate piles at the front of the class.

THANK YOU.

FINAL EXAM: **Saturday, December 8, 5-7:50pm, in KNE 110**

Bring with you:

1. PHOTO ID,

2. one handwritten sheet of notes, two-sided, 8.5"x11"
(**write on it your quiz section, since you'll need to know it**),

3. at least one scientific non-graphing calculator
(bring a spare or at least spare batteries),

4. a **transparent** long ruler,

5. pencils & erasers.

Please Note:

Using an inappropriate note-sheet or extra papers is a form of academic misconduct.
There will be different versions of the exam; do not search "inspiration" on someone else's paper!
Please wait outside of the room until we invite you to come in, about 10 minutes before the start of the test.

Material Overview:

The exam will be cumulative, covering ALL the material since the beginning of the quarter (except for section 6.5).
There will be 8-9 problems, in 2hrs and 50 minutes.

The points will be roughly evenly split between problems from the material of midterm 1, midterm 2, and the new material.

Midterm 1:

- **Graphs & Tables (Supplementary Reading)**
  Distance, time, speeds: AS, ATS.
  Business terms: TR/AR/MR, TC/AC/MC, VC/AVC/MC, FC, price per item, SDP, BEP
  [which ones are slopes? Of what lines? On the graphs of what?]
  profit, break even quantity, determining max profit (2 methods!)
  Questions about time/quantity generally require the use of reference lines. Be able to draw them and use them.
  How do you compute VC from AVC? TC from AC, TR from AR (or price)?
  Review Translations.
- **Linear Functions** (Chapter 1):
  Be able to compute the formula for a linear function from 2 given points (point-slope) or from a graph
  Constant rate of change=slope of linear function
  Be able to draw the graph from a formula or from a description.
  Solve linear equations and inequalities
  Supply and Demand: what they are, how to compute them, and how to find market equilibrium
  Be able to go: graph to formula, or formula to graph.
  Section 1.6: applications!

Midterm 2

- Linear Functions (Chapter 4):
  Linear systems and inequalities
  Linear programming problems -- review the method and do various practice examples.
- **Quadratic Functions** (Chapter 2)
  Be familiar with quadratic functions and their graphs.
  Vertex formula, what is it and what does it compute
  Quadratic Formula: what is it and what does it compute
  Be able to apply the correct formula in the context of applications to solve problems
  Be able to compute and simplify difference quotients $\left(\frac{f(a+h)-f(a)}{h}\right)$
- **Exponential and Logarithmic Functions** (studied in Chapter 5, also applied in Chapter 6)
  Be able to compute exponential and logarithmic values
  Be able to solve equations involving exponents, applying logarithms and their properties
  Applications! (section 5.3, chapter 6)

Last Part:

- **Financial Mathematics** (Chapter 6)
  Arithmetic Sequences & Simple Interest
  Geometric Sequences and Compound Interest (n times a year, or continuously compounded)
  (and be able to recognize the different cases in word problems!)
  Annual Percentage Yield (APY or APR), and percentage change in general (6.2 & activity)
  Annuities: ordinary and due
  formulas for future value
  formulas for present value
  Solving problems.

To prepare for the exam, I recommend the following:

- Start studying in advance of the exam. Read through your lecture notes a few times.
  Begin making your sheet of notes as you do this. Include definitions, formulas, and big ideas.
- Re-work any homework problems that you found difficult the first time through.

Re-do all group activities and test prep questions from quiz section.

- Look over our old lecture midterm reviews: Midterm 1, Midterm 2. Also recall: Table of Rates, List of Business Terms.
- Work as many problems as you can from old exams. (The exam is cumulative. So work old midterms as well as old finals.) You can find several old exams at the

  Math 111 Review Materials Website.

  Practice working these problems like you would if you were taking a test: limit your time and distractions, use only your sheet of notes, and use the answers only to check your work. (Working backwards from the answer is not a useful skill to develop.) Do as many problems as you can stand.
- Practice, practice, practice!

Math 111 Final review --- New Material (Chapter 6)

(file posted on website)

1. Sequences:
   - How to test if a given sequence is additive, multiplicative or neither.
   - Know how to find the n[th] term for additive and multiplicative sequences
     $$a_n = a_1 + (n-1)d, \text{and } a_n = a_1 m^{n-1}$$
   - Know how to find the sum of the first n terms for additive and multiplicative sequences
     $$s_n = \frac{n}{2}(a_1 + a_n), \text{and } s_n = a_1 \frac{1-m^n}{1-m}$$

2. Simple Interest (interest is applied to the principal P only):
   The account balance after ***t* interest periods** at a rate of r x 100% is: $\boxed{S = P + Prt.}$

3. Compounded Interest Formulas (interest is applied to the entire balance each time)
   - **Interest compounded n times a year**: $\boxed{S = P\left(1 + \frac{r}{n}\right)^{nt}}$

   (P =initial amount, r =yearly rate in decimal form, n = # of compoundings a year and t = #of years). Use this if you have a rate and an indication of how many times a year the interest is compounded (eg, monthly).
   Given enough information, you should be able to solve for:
   1. S (future value)
   2. P (present value, or principal)
   3. Nominal annual interest rate *r*
   4. # of years *t* (requires natural log: be able to use it)

   - **Continuously Compounded Interest**: $\boxed{S = Pe^{rt}}$
   Given enough information, you should be able to solve for:
   5. S (future value)
   6. P (present value, or principal)
   7. Nominal annual interest rate r (requires natural log)
   8. # of years t (requires natural log: be able to use it)

4. Annual Percentage Yield (APY).
   - Know how to compute **proportionate change** and **percent change** over a given time period:
     $$\text{prop. change} = \frac{\text{NEW} - \text{OLD}}{\text{OLD}}, \%\ change = \frac{\text{NEW} - \text{OLD}}{\text{OLD}} \times 100$$
   - Understand that the **APY** is the percentage change in the balance of an account over a one-year period, and that it's greater than or equal to the nominal annual interest rate listed by the bank. So:
     $APY = \frac{S-P}{P} \times 100\%$, where S = the balance after 1 year.
     So, depending on the type of account: $\boxed{APY = \left|\left(1 + \frac{r}{n}\right)^n - 1\right| \times 100\%}$ OR $\boxed{APY = |e^r - 1| \times 100\%}$

5. Annuities:

   a) If n equal **payments** of $\$R$ each are made at regular time intervals into an account earning $i \times 100\%$ interest each payment period, then the sum of all the payments and all interest earned is called the future value of the annuity:

   1) **Ordinary annuity**: the payments made at the END of equal time intervals. The future value is
   $$\boxed{\text{S} = \text{R}\,\frac{(1+\text{i})^{\text{n}} - 1}{\text{i}}}$$

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

2) **Annuity due**: the payments are made at the BEGINNING of the time intervals. The future value is:

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

b) If n equal **withdrawals** of $\$R$ each are made periodically, from an account earning $i \times 100\%$ each period, then the original amount needed in the account to supply the payments is called the present value of the annuity:

1) **Ordinary annuity**: the withdrawals are made at the END of equal time intervals.
Then the **present value** is:

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

2) **Annuity due**: the payments are made at the BEGINNING of the time intervals.
Then the present value is:

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

Be able to identify which situation(s) you have in a word problem, and which of the values of S, P, R, n, or i you are given, and be able to solve for ones not given .

An Example from last time (6.5 #35):

During four years of college, Nolan MacGregor's student loans are \$4000, \$3500, \$4400, and \$5000 for freshman year through senior year, respectively. Each loan amount gathers interest of 1%, compounded quarterly, while Nolan is in school and 3%, compounded quarterly, during a 6-month grace period after graduation.

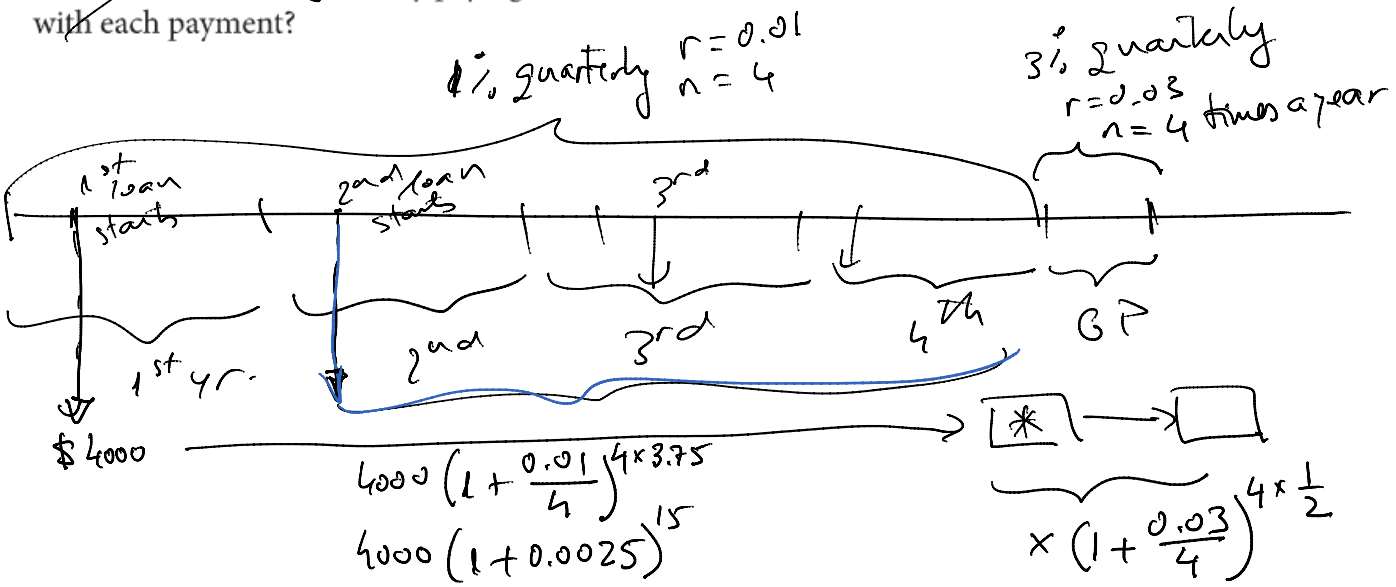
(a) What is the loan balance after the grace period? Assume the freshman year loan earns 1% interest for 3/4 year during the first year, then for 3 full years until graduation. Make similar assumptions for the loans for the other years.

(b) After the grace period, the loan is amortized over the next 10 years at 3%, compounded quarterly. Find the quarterly payment.

(c) If Nolan decides to pay an additional \$90 per payment, how many payments of this size will amortize the debt?

(d) How much will Nolan save by paying the extra \$90 with each payment?

$$S = P\left(1 + \frac{r}{n}\right)^{nt}$$



First loan: balance after grace period is:

$$4000\,(1.0025)^{15}(1.0075)^{2} \approx \boxed{\$4215.18}$$

Second loan: $3500\,(1.0025)^{4\times 2\frac{3}{4}}(1.0075)^{2} \approx \$3651.63$

Third loan: $4400\,(1.0025)^{4\times 1\frac{3}{4}}(1.0075)^{2} \approx \$4545$

Fourth loan: $5000\,(1.0025)^{4\times 3/4}(1.0075)^{2} \approx \$5113.44$

(+) $\approx \$17,525.25$ balance to

Fourth loan: 5000 (1.0025) (1.0075) =

(+) ≈ **17,525.25** balance to pay at end of grace period.

b) pay off loan in 10 yrs at 3% compounded quarterly : ordinary annuity

$P = \$17,525.25$

$R = ??$

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

$i = \frac{0.03}{4} = 0.0075$

$n = 40 = (10\text{yrs} \times 4\text{qtrs})$

$$17525.25 = R\,\frac{1-(1.0075)^{-40}}{0.0075}$$

$$\boxed{R = \$508.76}$$

MSC
CTTU B-006
12:30-4:30