MA 162: Finite Mathematics

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Announcements:

- Last financial math homework due Friday at 6pm.
- See the course webpage for final exam announcements - including an opportunity to increase your score on exam #3.

Compound Interest

- Suppose $\$P$ is invested for t years at an annual interest rate of r per year compounded m times per year.
- Let $i = r/m$. i is the interest rate per period
- Let $n = mt$. n is the number of periods
- The accumulated value, A, is given by

$$A = P(1 + i)^n$$

- Equivalently,

$$A + P\left(1 + \frac{r}{m}\right)^{mt}$$

- (Compound Continuously) If $\$P$ is invested for t years at a continuously compounded interest rate of r, then the accumulated value is

$$A = Pe^{rt}$$

Present Value Annuity/Loan

- P denotes the principal of a loan (how much was borrowed)
- R denotes the size of the payment
- t denotes the number of years (the term of the loan)
- r is the nominal interest rate per year
- m is the number of conversion periods
- i is the interest rate per period, so $i = r/m$
- n is the number of conversion periods in the term, so $n = mt$
- Then

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

Future Value of an Annuity/Loan

- F denotes the future value of the annuity (or loan)
- R denotes the payment size
- t denotes the number of years (the term of the annuity/loan)
- r is the nominal interest rate per year
- m is the number of conversion periods per year
- i is the interest rate period, so $i = r/m$
- n is the number of conversion periods in the term, so $n = mt$
- Then

$$F = R\left[\frac{(1+i)^n - 1}{i}\right]$$

Comparing Interest Rates

- The easiest way to compare interest rates is to see what happens to \$1 after 1 year under each given conditions.
- After finding the accumulated value of \$1 after 1 year you can subtract 1 from this value to get the effective interest rate in decimal form.
- If you prefer formulas, then you may memorize that the effective rate of change is given by

$$r_{eff} = \left(1 + \frac{r}{m}\right)^m - 1$$

Formulas for the Exam

- Compound Interest

$$FV = PV(1+i)^n$$

- Compounded Continuously Interest

$$A = Pe^{rt}$$

- Present Value of Annuity/Loan

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

- Future Value of Annuity/Loan

$$F = R\left[\frac{(1+i)^n-1}{i}\right]$$

- Effective Interest Rate

$$r_{eff} = \left(1+\frac{r}{m}\right)^m - 1$$

Direct Problems

- The final exam will have approximately 50 points which come from direct problems.
- Direct problems will generally consist of using one formula which is clearly stated.
- For direct problems on the exam you will be expected to give a correct numerical answer to two decimal places.
- Examples:
  - Web Assign 5.1: 1-9
  - Web Assign 5.2: 1,2
  - Web Assign 5.3: 1

Direct Word Problems

- The final exam will have approximately 30 points which come from direct word problems.
- Direct word problems will generally consist of using one formula, but they are given in story form.
- Which formula to use may not be obvious like in direct problems.
- Examples:
  - Web Assign 5.1: 10
  - Web Assign 5.2: 3,4
  - Web Assign 5.3: 2,3

Complex Word Problems

- The final exam will have approximately 25 points which come from complex word problems.
- Complex word problems will generally consist of multiple computations in order to get the final answer.
- You may have to use multiple formulas in a complex word problem as well.
- Examples:
  - Web Assign 5.1: 11
  - Web Assign 5.2: 5,6
  - Web Assign 5.3: 4,5