MA 162: Finite Mathematics

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Announcements:

- The next Web Assign assignment will be due after Thanksgiving.
- Read sections 1 and 2 of the supplemental financial math notes.

Financial Mathematics

- Technology Recommendations - Familiarize yourself with one of:
  - finance calculator, like TI's BA II or BA II plus
  - finance menu on the TI-83 or TI-84, or similar calculator
  - spreadsheet, like MS Excel
- Just like with probability, there will be many times on the exam where you are allowed to leave your answer in unsimplified form.

Time Value of Money (TVM)

- Money has different value depending on when you consider it.
- $1000 is not the same now as it was in 1900.
- The difference in value between two time periods is called *interest*.

Time Value of Money (TVM)

Why does money have a time value?

- Inflation - prices tend to increase with time, so more money is required to buy the same items.
- Risk Premium - If you invest money then there is a chance you won't get it back, so the increase in amount you get compensates for this possibility.
- Utility/Opportunity Cost - If you invest money then you can't spend the money while it's in the account so interest compensates you for forfeiting the right to spend the money.

Time Value of Money (TVM)

- Be careful when comparing dollar amounts!
- Just like with anything else, units must be the same to compare two values.
- The units in this chapter are dollar amounts at different times.

Non-money Example

- Bob has 30lbs of gold in a safe in his basement. Chuck has 20kgs of gold hidden in the cellar on his farm. Who has more gold?

- How much gold to they have together?

First Principle of Financial Mathematics

- The values of two monetary figures can only be directly compared if they occur at the same point in time.
- The values of two monetary figures can only be added or subtracted if they occur at the same point in time.
- In order to compare the values of two monetary figures occurring at different points in time, it is necessary to apply a conversion factor.

Which is better?

Congratulations! You just won the lottery! You are given two options:

- collect $7 million right now
- collect $500000 every year for the next 20 years

Which option do you choose?

Time Value of Money (TVM)

Which is better?

- $1000 in 1985
- $1200 in 2004

Second Principle of Financial Mathematics

Let A and B represent two financial transactions occurring at possibly different times.

- If, at some point in time t, the value of A is less than the value of B valued at the same time t, then the value of A valued at any other time s will also be less than the value of B valued at time s.

- If, at some point in time t, the value of A is equal to the value of B at the same time t, then A and B will have the same value when valued at any other point in time.

Accumulation and Discount Factors

- To convert an earlier time to a later time, you multiply by an *accumulation factor*.
- To convert a later time to an earlier time, you multiply by a *discount factor*.
- Accumulation factors and discount factors are reciprocals of each other.

Example

- You are to receive \$1000 one year from now, and another \$1500 three years from now. How much is this money worth right now? Assume that money increases in value by 3% every year.

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