Summary of Topics for Test 2

The test will cover material from sections 5.3, 5.4, 5.5, 5.6, 5.7, 6.2, 6.3, 6.4, and 6.5

These are things that you should study:

- **Three Set Venn diagrams**
  - how to fill in the diagram from survey results and answer questions from information in the completed diagram.

- **Counting**
  The Multiplication Principle and using trees for counting
  Permutations – counting the number of ordered arrangements.
  \[ P(n,r) = \frac{n!}{(n-r)!} \]
  Combinations – counting the number of subsets or unordered samples
  \[ C(n,r) = \frac{n!}{(n-r)!r!} \]
  Special families of counting problems-
  1. Toss a coin n times (or choose a binary strings of length n at random)
  2. Drawing balls form the urn
  3. Street networks

- **The Binomial Theorem**
  - how to expand \((x + y)^n\) and find coefficients of the terms.
  - how to apply the Binomial Theorem to counting problems

- **Probability**
  Terms: sample space, outcomes, events, complement, union and intersection of events.
  Properties of Probability
  For any event \(E\), \(P(E) + P(E') = 1\)
  For any events \(E\) and \(F\), \(P(E \cup F) = P(E) + P(F) - P(E \cap F)\)
  - how to calculate the Empirical Probability of outcomes and events from a data set
  - how to calculate the Theoretical Probability of outcomes and events when the outcomes are equally likely:
    \[ P(s) = \frac{1}{n(S)} \]
    \[ P(E) = \frac{m(E)}{n(S)} \]
  Conditional Probability
  The probability of \(E\) given \(F\): \(P(E/F) = \frac{P(E \cap F)}{P(F)}\)