

MA 162: Finite Mathematics

Fall 2014

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Announcements:

- Homework 7.5 due Tuesday at 6pm.
- Exam #3 is TONIGHT 5-7pm.

Quick Review

6.1 Sets and Set Operations

- Definitions:

- set, elements, subset, empty set, universal set, Venn diagram

- Set Operations:

- union, intersection, complement

6.2 The Number of Elements in a Finite Set

- $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

- $n(A \cup B \cup C) =$
 $n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$

6.3 The Multiplication Principle

- Suppose there are m ways of performing a task T_1 and n ways of performing a task T_2 . Then there are mn ways of performing the task T_1 followed by task T_2 .
- Tree diagram
- Generalized multiplication principle

6.4 Permutations and Combinations

- Permutations are when order matters
- Combinations are when order doesn't matter
- Both often get combined with the multiplication principle and used in probability questions.

7.1 Experiments, Sample Spaces, and Events

- Definitions:
 - experiment, sample point, sample space, event, mutually exclusive

7.2 The definition of probability

- Probability when each outcome is equally likely.
- Probabilities are numbers between 0 and 1.

7.3 Rules of Probability

- Probability of an event is always between 0 and 1.
- The probability of something in the sample space occurring is 1.
- If E and F are mutually exclusive events, then

$$P(E \cup F) = P(E) + P(F)$$

- $P(E \cup F) = P(E) + P(F) - P(E \cap F)$ for any events E and F .
- $P(E^c) = 1 - P(E)$ for any event E .

Quick Review

7.4 Use of Counting Techniques in Probability

- If S is a uniform sample space, then the probability of event E happening is

$$P(E) = \frac{\text{Number of outcomes in } E}{\text{Number of outcomes in } S} = \frac{n(E)}{n(S)}$$

7.5 Conditional Probability and Independence Events

- The probability of event B happening given that event A has already occurred is

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

- Two events are independent if and only if

$$P(A \cap B) = P(A)P(B)$$