MATH 460: Probability & Statistics — September 2018

Chapter 1: Basic Probability

In-Class Activity #1 — Dr. Basilio

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Southern California Institute of Technology

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Sets

Activity 1: Venn Diagrams

What is a Venn Diagram? If you know what it is, use them to illustrate the all of the definitions from Definition 1.

Activity 2: Set Theory

Consider the sets $A = \{1, 2, 3, 4, 5\}$ and $B = \{2, 4, 6, 8, 10\}$ where $S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$. Compute each of the following sets:

(a) $A \cup B$

(b) $A \cap B$

(c) A'

(d) B'

(e) $B - A$

(f) $A - B$

(g) $(A \cup B)'$

(h) $A' \cup B'$

(i) $(B - A') \cap (A \cap B)'$

Activity 3: Set Theory

Consider the sets $A = \{4, 5, 6, 7, 9, 13, 16\}$ and $B = \{3, 6, 9, 12, 15\}$ where the sample space S consists of all positive integers less than or equal to 16. Find the following:

(a) $A \cup B$

(b) $A \cap B$

(c) A'

(d) $(A \cap B)'$

Sample Space

Activity 4: Sample Space/Outcomes

List all possible outcomes for the following.

(a) Flipping a coin 4 times.

(b) Rolling 2 six-sided dice at the same time.

Events

Activity 5: Events

Let S be the sample space of flipping a coin twice. Let A b the event "at least one head occurs" and B be the event "the second toss results in a tail." Express A and B using the H and T notation and find:

(a) $A \cup B$

(b) $A \cap B$

(c) A'

(d) $A - B$

Permutations

Activity 6: Permutations

Calculate the following:

(a) $10!$

(b) ${}_8P_5$

(c) ${}_4P_4$

Activity 7: Permutations and Combinations

(a) In how many ways can 10 people be seated on a bench if only 4 seats are available?

(b) Castel and Joe are planning trips to three countries this year. There are 7 countries they would like to visit. One trip will be one week long, another two days, and the other two weeks. How many possibilities are there?

Activity 8: Combinations

Calculate the following:

(a) ${}_{12}C_{10}$

(b) ${}_{7}C_{7}$

Activity 9: Permutations and Combinations

(a) In how many ways can 10 objects be split into two groups containing 4 and 6 objects, respectively?

(b) In how many ways can a team of 17 softball players choose three players to refill the water cooler?