Homework 2
Due by Midnight on 10/02/2015

Instructions:

(1) All parts must be completed for credit

(2) You must show work to receive credit

(3) You must turn in homework on Canvas!

Question 1: Properties of Probability (20pts)

Each day on Boston College campus, 60% of all students read a source of current events (e.g. newspaper), while 80% use social media.[1] 50% of students partake in both activities daily. If a student is randomly selected what is the probability that:

(a) The selected student either reads current events or uses social media?

(b) That the student takes part in **only one** of the activities?

[1] Numbers made up by instructor

Question 2: Properties of Probability (30pts)

Suppose you roll a pair of dice, and take the sum. Let A be the event that you observe an even number. Let B be the event that you observe a number greater than seven. Begin by writing down the two sets A & B as well as the sample space.

(a) What is the intersection of A & B? What is the complement of $\bar{A}$? What is the complement of $\bar{B}$?

(a) What is $\bar{A} \cap B$? What is $\bar{A} \cup B$?

(c) What is $\bar{A} \cup \bar{B}$? What is $\bar{A} \cap \bar{B}$

(d) Are A and B multually exclusive? Are they collectively exhaustive? If not, write down two sets that would satisfy these definitions.

Question 3: Conditional Probability & Bayes Rule (30pts)

1 in 1000 adults is afflicted with a rare disease for which the a diagnostic test has been developed. A positive result occurs 99% of the time when the individual actually has the disease and 2% of the time when the individual does not have the disease.

(a) What is the probability that a random person selected has the disease and they receive a positive result?

(b) What is the probability that, if a random individual tests positive, he actually has the disease?

(c) Does this result make sense to you?

Question 4: Permutations and Combinations (20pts)

There are ten teaching assistance available for a statistics course at a large state university. Throughout the semester the professor must assign various tasks.

(a) Grading: The professor gives a midterm exam with four questions, and needs to grade the exam. He would like to have a different TA grade each question, and thus assign one assistant to grade each question. How many ways can he choose assistants for grading?

(b) Office hours: Each week four TAs must hold office hours at the 1pm on Thusdays. How many ways may the professor assign TAs to this task?