Exam 1, Math 3770, Fall 2008

July 26, 2009

1.
    a. List the three axioms of probability from our text.
    b. Define what it means for two events to be independent.
    c. Define "upper fourth", "lower fourth" and "fourth spread".
    d. Define "sample variance".
    e. Define "Bernoulli random variable".

2. A bag contains 10 red marbles, 8 blue marbles and 6 green marbles. You draw marbles one at a time, without replacement, until you select a green marble, in which case you stop. What is the probability that you draw at least 3 marbles before you stop?

3. Prove that if A and B are independent events then

$$P(A \cup B) \ = \ 1 - (1 - P(A))(1 - P(B)).$$

4. A cafe that only serves tea, serves three kinds: Green, Black and White. There are only two kinds of customers of the cafe: college students and locals (they are assumed to be mutually exclusive). 30 percent of locals prefer Black tea, while 20 percent prefer White tea; and, 10 percent of college students prefer Green tea. Locals make up 30 percent of the customers of the cafe. What is the probability that a randomly selected Green tea drinker (they prefer Green tea) is a local?

5. Compute the median, mean, sample variance, and fourth spread of the following numbers:
$$1, \ 2, \ 3, \ 6, \ 7, \ 4, \ 10.$$