IAM 530 2014-2015 Fall

Homework 1

1) A survey is carried out at a university to estimate the proportion of undergraduates living at home during the current term. Since it is time consuming to survey all the students investigators choose 400 students randomly. Define the population, sample, parameter and statistic of this survey.

2) For the following experiments, describe the sample space

- Toss a coin four times
- Measure the lifetime (hours) of a particular brand of light bulb.

3) In the game of dominoes each piece is marked with two names the pieces are symmetrical so that number pairs are not ordered (so, for example (2,6)=(6,2)). How many different pieces can be formed using numbers 1,2,…,n? (Answer: n(n+1)/2 I want the solution)?

4) If P(A)=1/3 and $P(B^c)$=1/4 can A and B be disjoint?

5) Prove each of the following

a) If P(B))1 then P(A|B)=P(A) for any A

b) If A and B are mutually exclusive then $P(A \mid A \cup B) = \dfrac{P(A)}{P(A) + P(B)}$

c) Suppose P(A)>0 and P(B)>0 If A and B are mutually exclusive they cannot be independent

6) Suppose that 5% of men and 0,25% of women are color blind. A person is chosen at random and person is color blind. What is the probability that the person is male? (Assume number of males and females are equal)

7) An insurance company has three types of customers – high risk, medium risk, and low risk. Twenty percent of its customers are high risk, and 30% are medium risk. Also, the probability that a customer has at least one accident in the current year is 0.25 for high risk, 0.16 for medium risk, and 0.1 for low risk.

a) Find the probability that a customer chosen at random will have at least one accident in the current year.

b) Find the probability that a customer is high risk, given that the person has had at least one accident during the current year.