Practice for exam 2

Math 362, Spring 2011

1.Suppose a six-sided die is rolled repeatedly.
(A) Find the probability of getting "1" on the third roll.
(B) Find the probability of getting the second "1" on the 7^{th} roll.
(C) Find the probability that the die has to be rolled at least eight times before two ones are observed.
(D) Find the expected value, the variance, and the standard deviation of the number of times the die must be rolled to obtain two ones.

2. The number of phone calls coming into a particular cellular relay system, has a Poisson distribution. Suppose that the probability of a no-call during a 1-min period is 0.1.
(A) Find the probability of having two or more calls during a particular 1-min period.
(B) Find the probability that no calls will pass through the relay system during a 2-min period.

3. An urn contains 8 white and 5 black balls. 4 balls are randomly selected and without replacement. Let X be the number of black balls selected. Find the expected value of X.

4. Customers at a football game win a 50 dollar prize if the ticket receipts show a star on each of the three consecutive days Friday, Saturday and Sunday in any one week. The probability of receiving a star is 0.2 on each of the tickets and the appearance of a star is an independent process. If a customer goes to each game for five consecutive weeks what is the expected number of dollars won by the customer in the five-week period?

5. Suppose that a panel of three judges will vote to convict with probability 0.01 if a defendent is innocent and will vote to convict with probability 0.95 if the defendent is guilty. 90% of the defendents who go to trial are guilty. The judges determine whether the defendent is convicted by majority vote. Each judge acts independently. Out of 50 randomly selected cases determine the expected value and standard deviation of the number of innocent people who are convicted.

6. A large animal clinic schedules 10 dogs to be tested for a certain disease each day. The cost of each test is $100. The probability of a dog having the disease is 5%. If the dog has the disease, the treatment costs $400.
(A) What is the probability that at least two dogs will be diagnosed with the disease on a randomly selected day?
(B) What is the expected daily revenue that the clinic earns from testing dogs for the disease and treating those that are sick?
(C)Within what interval would you expect the daily revenue to lie with a probability of at least 0.75.