Problems on Binomial and Poisson Distribution:

1. It is known that any item produced by a certain machine will be defective with probability 0.1 independently of any other item. What is the probability that in a sample of 3 items,at most 1 is defective?

2. A and B play a game in hich their chance of winning are in the ratio 3:2. Find A's chance of winning at least 3 out of 5 games played.

3. In a binomial distribution consisting of 5 independent trials,the probability of 1 and 2 successes are 0.4096 and 0.2048 respectively. Find the parameter p of the distribution.

4. Suppose that an airplane engine will fail when in flight with probability $(1 - p)$ independently with respect to any other engine. Suppose that the airplane will make successful flight if at least 50% of its engines remain operative. For what values of p is a 4-engine plane preferable to a 2-engine plane.

5. An airline knows that 5% of the people making reservation on a certain flight will not show up. Consequently,their policy is to sell 52 tickets for a flight that can hold only 50 passengers.What is the probability that a seat will be available for every passenger who shows up?

6. A manufacturer of copper pins knows that 5% of the products is defective. If he sells copper pins in boxes of 100 and guarantees that not more than 10 pins will be defective,what is the probability that a box will fail to meet the guaranteed quality.

7. A radioactive source emits on the average 2.5 particles per second. Calculate the probability that 2 or more particles will be emitted in an interval of 4 seconds.

8. How long a series of random digits has to be in order so that the probability of the digit '7' appearing is at least 9/10.

9. A supermarket has 4 checkouts in operation. A customer is in a hurry and leaves without making a purchase if all the checkouts are busy. At that time of day the probability of each checkout being free is 0.25.Assume that whether or not a checkout is busy is independent of any other checkout. What is the probability that the customer will make a purchase?

10. A data center has 10000 disk drives . Suppose that a disk drive fails in a given day with probability 0.001.
(a) Find the probability that there are no failures on a given day.
(b) Find the probability that there are fewer than 10 failures in 2 days.