***Tutorials on probability discrete models***

**Example 1**: In a system, three machines are connected. Each machine creates a typo with the rate 1 per 1000 pages and machines are working independently. The system requires to be repaired if at least two machines create more than 2 typos per 1000 pages. What is the probability of this event that the system is properly working?

(b) What is the probability of the event that at least 2 machine generate at most 1 typo?

(c) Find the expectation of number of typos in 4000 pages.

**Example 2:** In a product line, 5 steps are in process. The line can produce the items if at least the first 3 steps are active. Each step is independently active with p=0.8.

(a) What is probability of manufacturing items?

(b) Find the expectation and variance of producing items.

**Example 3:** A urn has 1000 balls: 700 green, 300 blue. A sample of 7 balls is drawn, without replacement. What is the probability that it has 3 green balls and 4 blue balls?

Example 4: Consider a computer system with Poisson job-arrival stream at an average of 2 per minute. Determine the probability that in any one-minute interval there will be (i) 0 jobs; (ii) exactly 2 jobs; (iii) at most 3 arrivals.

Example 5: There are 10 black marbles and 10 white marbles out of which 5 marbles are being chosen. Find the probability that there are 2 white marbles in them.

Example 6: There are 6 bulbs in a house out which 3 are defective. If 2 bulbs are picked randomly, find the probability that at least one is defective.

Example 7: Births in a hospital occur randomly at an average rate of 1.8 births per hour. What is the probability of observing 4 births in a given hour at the hospital?

What about the probability of observing more than or equal to 2 births in a given hour at the hospital?

Example 8: Five users are active in a network. Each user is independently connected to the network with probability .8. we test whether each user is in the network or not. What is the probability of having the first connection in the third test?

The network is likely to be failed if at least 4 users are in. what is the probability of the failure of network?

Let us assume that three users are internal. What is the probability of having 2 internal users in 3 sample test?

Example 9: A man was able to complete 3 files a day on an average. Find the probability that he can complete at most 4 files the next day.