**Assignment I (CS/IT)**

**Submit on or before: 11/02/2014**

1. Urn A contains 8 white and 7 black balls. Urn B contains 9 black and 7 white balls. A ball is randomly drawn from Urn A and placed in B and then a ball is transferred from Urn B to A. Finally, a ball is selected from Urn A. What is the probability that this ball is white?
2. There are two groups of subjects one of which consists of 5 Science and 3 Engineering subjects and the other consists of 3 Science and 5 Engineering subjects. An unbiased die is tossed. If number 3 or number 5 turns up, a subject is selected at random from the first group, otherwise subject is selected at random from the second group. Find the probability that an Engineering subject is selected.
3. In general, when ‘A’ and B play 12 games of chess, 6 are won by A, 4 are won by B and 2 end in a draw. They agree to play a tournament consisting of 3 games. Find the probability that
4. A wins all 3 games
5. 2 games end in a draw
6. A and B win alternatively
7. B wins at least one game.
8. Prove that for  events, .
9. Two absent-minded roommates, mathematicians, forget their umbrellas in some way or another. A always takes his umbrella when he goes out, while B forgets to take his umbrella with probability ½. Each of them forgets his umbrella at a shop with probability ¼. After visiting three shops, they return home. Find the probability that
10. They have both umbrellas
11. They have only one umbrella
12. B has lost his umbrella given that there is only one umbrella after their return.
13. At an art exhibition, there are 12 paintings of which 10 are original. A visitor selects a painting at random and before he decides to buy, he asks the opinion of an expert about the authenticity of the painting. The expert is right in 9 out of 10 cases on average.
14. Given that the expert decides that the painting is authentic, what is the probability that this is really the case?
15. If the expert decides that the painting is copy, then the visitor returns it and chooses another one; what is the probability that his second choice is original?
16. The chances that a Doctor A will diagnose a disease X correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chances of the death by wrong diagnosis is 70%. A patient of a Doctor A, who had disease X, died. What is the chance that his disease was diagnosed correctly?
17. N letters are placed at random in N addressed envelopes. What is the probability that each letter will be placed in a wrong addressed envelope?
18. The distribution of a continuous random variable X is given by p.d.f.  ,

Determine the mean and variance of this distribution.

1. The random variable X has the following probability function:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| X | -2 | -1 | 0 | 1 | 2 | 3 |
| P(x) | 0.1 | K | 0.2 | 2k | 0.3 | K |

i) Find the value of k

ii) Evaluate P (0<x<3), P(x>-1)

iii) Calculate mean and variance

iv) Construct the c.d.f. F(x).