GRAPHIC ERA HILL UNIVERSITY
Department of Mathematics
TMA-316 : Discrete Mathematical Structures and Combinatorics
(Assignment No: 3)

Last Date of Submission : 15-Oct-2023

1. If three coins are tossed, represent the sample space and the event of getting at least two heads and also find the number of elements in them.

2. Two dices are thrown simultaneously. Find the probability obtaining total score less than 11.

3. If a leap year is selected at random, what is the chance it will contain 53 Sunday ?

4. A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that -
   a) all the three balls are white;
   b) all the three balls are red;
   c) one ball is red and two balls are white.

5. A student appears for tests I, II and III. The student is successful if he passes either tests I and II or tests I and III. The probability of the student passing in test I, II and III are p, q and $1/2$ respectively. If the probability that the student is successful is $1/2$, find the relation between p and q.

6. Let A and B be two independent events. The probability that both A and B happen is $1/12$ and probability that neither A nor B happen is $1/2$. Find the probability of occurrence of A and B.

7. Let A, B and C are three events. If the probability of occurring exactly one event out of A and B is $1-a$, out of B and C is $1-2a$, out of A and C is $1-a$ and that of occurring three events simultaneously is a^2, then prove that the probability that atleast one out of A, B and C will occur is greater that $1/2$.

8. The probability that certain electronic component fails when first used is 1.10. If it does not fail immediately, the probability that it lasts for one year is 0.99. What is the probability that new component will last for one year.

9. Three groups A, B and C are contesting for position on the **Board of Directors** of a company. The probability of their winning are $0.5, 0.3$ and 0.2 respectively. If the group A wins, the probability of introducing new product is 0.7 and the corresponding probabilities for group B and C are 0.6 and 0.5 respectively. Find the probability that new product will be introduced.

10. An urn contains 2 white and 2 black balls. A ball is drawn at random. If it is white, it is not replaced in to the urn, otherwise it is replaced along with the another ball of the same colour. The process is repeated. Find the probability the third ball drawn is black.

11. Two dice are thrown. Find the probability that the sum of the numbers coming up on them is 9, if it is known that the number 5 always occurs on the first dice.

12. A man is known to speak 3 truth out of 4 times. He throws a die and reports that it is 6. Find the probability that it is actually 6.

Please go on to the next page...

13. If A and B are two independent witnesses (*i.e.* there is no collusion between them) in a case. The probability that A will speak the truth is x and the probability that B will speak the truth is y. A and B agree in a certain statement. Show that the probability that the statement is true, is - $$\frac{xy}{1-x-y+2xy}.$$

14. If on an average, out of 10 ships, one is drowned, then what is the probability that out of 5 ships, at least 4 reach safely ?

15. A man takes a step forward with probability 0.4 and backward with probability 0.6. Find the probability that at the end of eleven steps he is one step away from the starting point.

16. Write probability distribution when three coins are tossed.

17. The mean and variance of a binomial variable X are 2 and 1 respectively. Find the probability that X takes values greater than 1.

18. Suppose 3% of bolts made by a machine are defective, the defects occurring at random during production. If bolts are packaged 50 per box, find :
    (a) exact probability, and
    (b) Poisson approximation to it, that a given box will contain 5 defectives.

19. Define the function and types of functions with suitable examples.

20. The number of arrivals of customers during any day follows Poisson distribution with a mean of 5. What is the probability that the total number of customers on two days selected at random is less than 2 ?

21. On a final examination in mathematics, the mean was 72, and the standard deviation was 15. Determine the standard scores of students receiving graders
    (a) 60 (b) 93 (c) 72

22. Students of a class were given an aptitude test. Their marks were found to be normally distributed with mean 60 and standard deviation 5. What percentage of students scored more than 60 marks?

** * * * * * * All the Best * * * * * * **

Dr. Sunil Kumar
Department of Mathematics,
Graphic Era Hill University, Dehradun.
Email: *dr.sunilkumar@live.com*

End of the assignment..