Question 1

Combinations and Permutations: From first principles, compute the following: 1. 5C2 2. 4C0 3. 4C4 4. 10C1 5. 10C0

Question 2

Six horses are entered in a race. Larry picks two of the horses at random, and bets on them. How many ways are there of picking two horses at random from six?

Question 1

Compute the probability p of each event: (a) An even number appears in the toss of a fair die; (b) One or more tails appear in the toss of three fair coins; (c) A blue marble appears in a random drawing of one marble from a box containing four white, three blue, and five red marbles.

Question 2

Suppose a student is selected at random from 100 students where 30 are taking mathematic classes, 20 are taking computer science classes, and 10 are taking both mathematics and computer science classes. Find the probability p that the student is taking either mathematics or computer science classes.

Question 3

A lot contains 13 items of which 4 are defective. Three items are drawn at random from the lot one after the other. Find the probability p that all three are non-defective.

Question 4

The probability that A hits a target is 1/3 and the probability that B hits a target is 1/5. They both fire at the target. Find the probability that:
(a) A does not hit the target; (b) both hit the target; (c) only one of them hits the target; (d) at least one hits the target. (d) neither hits the target.

Question 5

On completion of a programming project, four programmers from a team submit a collection of subroutines to an acceptance group. The following table shows the percentage of subroutines each programmer submitted and the probability that a subroutine submitted by each programmer will pass the certification test based on historical data.
Programmer A B C D Proportion of subroutines submitted 0.10 0.20 0.30 0.40 Probability of acceptance 0.55 0.60 0.95 0.75

Question 5

(i) What is the proportion of subroutines that pass the acceptance test? (ii) After the acceptance tests are completed, one of the subroutines is selected at random and found to have passed the test. What is the probability that it was written by Programmer A?

Question 6

Two manufacturing plants produce similar parts. Plant A produces 1000 parts, 100 of which are defective. Plant B produces 2000 parts, 170 of which are defective.

1. Present this information using a contingency table
2. A part is selected at random and found to be defective. What is the probability that it came from plant A ?

Question 7

A machine is composed of 2 components A and B, which function independently of one another. The machine works only if both components are working. The probability that component A works is 0.98 and the probability that component B works is 0.95. a) What is the probability that the machine works, b) What is the probability that both components have failed.

Question 8

Two dice are rolled, find the probability that the sum is

a) equal to 1

b) equal to 4

c) less than 13

Question 9

A coin is tossed three times. Use a probability tree to determine the probability of 0 heads, 1 head, 2 heads, and 3 heads.

Question 5 Consider a binomial experiment where the number of independent trials is 10, and the probability of success is 0.25. Let X denote the number of successes in the 10 trials. A) Write out the sample space of X. B) For the each of the following events, write out the sample points: i) the number of successes is less than or equal to 3, ii) the number of successes is greater than 4, iii) the number of successes is greater than 8, iv) the number of successes is between 4 and 7 inclusive.

Question 6 By considering the relevant sample points from the sample space in the previous question, show that (i.e. show how the sample space can be partitioned accordingly)

Question 7: Binomial Distribution: Suppose that a student is taking a multiple-choice exam in which each question has four choices. Suppose that she has no knowledge of the correct answer to any of the questions. Furthermore suppose that she selects one of the possible choices at random as her answer. A. lf there are five muItiplechoice questions on the exam, what is the probability that she will answer four questions correctly. B. What is the probability that she will answer none of the questions correctly? C. What is the probability that she will answer at least two questions correctly?

Question 8 A company owns 400 laptops. Each laptop has a 2% probability of not working. You randomly select 20 laptops for your salespeople. A. What distribution do you feel is appropriate here. Justify your answer. B. What is the probability that they will all work? C. What is the probability that only one will be broken? D. What is the probability that at least two will be broken?

Question 9: Poisson Distribution Cars enter a car wash at an average rate of 4 per half hour. 1) Compute the probability that the 3 cars arrive in a half hour period. 2) Compute the probability that the 3 cars arrive in a 15 minute period.