Mathematics Assignment - 01
Probability

October 11, 2018

Solve the following:

1. Two dice are rolled, find the probability that the sum is equal to 5.
2. A die is rolled and a coin is tossed, find the probability that the die shows an odd number and the coin shows a head.
3. Among the digits 1,2,3,4,5 first one is chosen, and then a second selection is made among the remaining four digits. Assume that all twenty possible results have the same probability. Find the probability that an odd digit will be selected (a) the first time, (b) the second time, (e) both times.
4. In a knockout cricket tournament, 16 teams are participating. The probability of team A winning a game is 5/6 (assume that all teams play one match in each round). Find the probability that (a) team A winning the tournament, (b) team A to be runners up, (c) team A reaching semifinal, (d) team A is out of tournament in 2nd round.
5. In a simultaneous toss of three coins, find the probability of (a) exactly 2 tails, (b) at least one tail.
6. In a single throw of two dice, what is the probability of a multiple of 2 on one and a multiple of 3 on the other?
7. A drawer contains 50 bolts and 150 nuts. Half of the bolts and half of the nuts are rusted. If one of them is chosen at random, what is the probability that it is rusted or is a bolt?
8. An integer is chosen at random from first two hundred natural numbers. What is the probability that the integer chosen is divisible by 6 or 8?
9. Two dice are rolled simultaneously. Find the probability that the sum of the numbers on the faces neither divisible by 3 nor by 4.
10. If a die is rolled twice,find the probability of (a) getting an even number in the first time or a total of 8, (b) getting an even number in the first time and a total of 8.
11. What is the probability of rolling three six-sided dice, and getting a different number on each die?
12. A magician holds one six sided die in his left hand and two in his right. What is the probability the number on the dice in his left hand is greater than the sum of the dice in his right?
13. An urn contains 5 red, 6 blue, and 8 green balls. If a set of 3 balls is randomly selected, what is the probability that each of the balls will be (a) of the same color, (b) of different colors.
14. If a die is rolled 4 times, what is the probability that 6 comes up at least once?

15. Fifty-two percent of the students at a certain college are females. Five percent of the students are majoring in computer science. Two percent of the students are women majoring in computer science. If a student is selected at random, find the conditional probability that (a) this student is female, given that the student is majoring in computer science, (b) this student is majoring in computer science, given that the student is female.

16. There are 3 urns A, B and C. Urn A contains 4 red balls and 3 black balls. Urn B contains 5 red and 4 black balls. Urn C contains 4 red balls and 4 black balls. One ball is drawn from each of these urns. What is the probability that the 3 balls drawn consist of 2 red balls and 1 black ball?

17. coin is tossed repeatedly until head occurs for the first time, find the probability that number of tosses required is odd.

18. Saurabh and Mangesh appear for an interview for two vacancies. The probability of Saurabh's selection is 1/3 and that of Mangesh's selection is 1/5. Find the probability that (a) only one of them will be selected, (b) both of them are selected (c) at least one of them is selected.

19. The probability that A,B and C solving a problem are 1/3, 2/7 and 3/8 respectively. If all the three try and solve the problem simultaneously , find the probability that only one of them will solve it.

20. An automotive plant is contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All the shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. 96% of shock absorbers produced by X are reliable and 78% of shock absorbers produced by Y are reliable. The probability that a randomly chosen shock absorber, which is found to be reliable is made by Y is?

21. There are 10 persons who are to be seated around a circular table. Find the probability that two particular persons will always sit together.

22. 20 politicians are having a tea party, 6 Democrats and 14 Republicans. To prepare, they need to choose: 3 people to set the table, 2 people to boil the water, 6 people to make the scones. Each person can only do 1 task. (a) In how many different ways can they choose which people perform these tasks? (b) Suppose that the Democrats all hate tea. If they only give tea to 10 of the 20 people, what is the probability that they only give tea to Republicans? (c) If they only give tea to 10 of the 20 people, what is the probability that they give tea to 9 Republicans and 1 Democrat?

23. Stores A, B, C have 50, 75, and 100 employees, and, respectively, 50, 60, and 70 percent of these are women. Resignations are equally likely among all employees, regardless of sex. One employee resigns and this is a woman. What is the probability that she works in store C?

24. A chartered accountant applies for a job in two firms X and Y. He estimates that the probability of his being selected in firm X is 0.7 and being rejected in Y is 0.5 and the probabilty that atleast one of his applications rejected is 0.6. What is the probability that he will be selected in one of the firms?

25. An anti aircraft gun can take a maximum of four shots at an enemy plane moving away from it. The probability of hitting the plane at first, second, third and fourth shots are 0.4, 0.3, 0.2 and 0.1. What is the probability that the gun hits the plane?

26. Two buckets contain black and white balls. The first has 5 black and 3 white, and second one has 4 white and 4 black balls. A ball is picked from the first bucket and put into the second bucket. Next a ball from the second bucket is picked and put into first bucket. Find the probability of the event that after these actions the composition of first bucket has become that of the second one and the composition of the second bucket has become that of first bucket.

27. Find the number of permutations of the letters of the word 'REMAINS' such that the vowels always occur in odd places.

28. Find the number of different words that can be formed with the letters of the word 'RAINBOW' so that the vowels are always together.

29. A Southwest Energy Company pipeline has 3 safety shutoff valves in case the line starts to leak. The valves are designed to operate independently of one another. There is a 7% chance that valve 1 will fail ,10% chance that valve 2 will fail 5% chance that valve 3 will fail. If there is a leak in the line, find the following probabilities: (a) all three valves operate correctly, (b)all three valves fail, (c)only one valve operates correctly, (d)at least one valve operates correctly.

30. If you draw two cards from the deck without replacement, what is the probability that the second card will be an ace if the first card is a king?

31. An elementary school is offering 3 language classes: one in Spanish, one in French, and one in German. These classes are open to any of the 100 students in the school. There are 28 students in the Spanish class, 26 in the French class, and 16 in the German class. There are 12 students that are in both Spanish and French, 4 that are in both French and German, and 6 that are in both Spanish and German, In addition, there are 2 students taking all 3 classes. (a) If a student is chosen randomly, what is the probability that he or she is not in any of these classes? (b) If 2 students are chosen randomly, what is the probability that at least 1 is taking a language class?