Assignment 1, PME, 4th Semester, Spring 2023

Deadline: Before the start of PME mid-term exam paper

Assignment should be hand written.
Write your name, registration No. and section; else your assignment may not be marked.
Copying is not allowed.
Write in your own words.
Properly staple your pages (binding is not required).

1. There are 10 boys and 15 girls in a class. If three students are selected at random, what is the probability that 2 girl and 1 boys are selected?
2. A standard dice is rolled. What is the probability that a 2, 4, OR 6 will be rolled?
3. Ali khan will toss a fair coin twice. If you know that the first coin toss resulted in heads, what would the probability be that both coins would land on heads?
4. A basket contains 6 black, 2 blue, 4 white and 3 yellow balls. If three balls are picked up at random, what is the probability that none is yellow?
5. Two buddies Jamal and Khan appeared for an entry exam. Let A be the event that Jamal is selected and B is the event that Khan is selected. The probability of A is 2/5 and that of B is 3/7. Find the probability that both of them are selected.
6. 16 persons shake hands with one another in a party. How many shake hands took place?
7. Daniel speaks truth in 2/5 cases and Sherin lies in 3/7cases. What is the percentage of cases in which both Daniel and Sherin contradict each other in stating a fact?
8. Suppose we have 4 shirts of 4 different colors and 3 pants of different colors. How many different outfits are there?
9. How many different license plate numbers with 3 letters followed by 3 numbers are possible?
10. How many ways can one arrange 4 math books, 3chemistry books, 2 physics books, and 1 biology book on a bookshelf so that all the math books are together, all the chemistry books are together, and all the physics books are together?
11. Suppose there are 8 men and 8 women. How many ways can we choose a committee that has 2 men and 2 women?
12. Let $S = \{1, 2, 3, 4\}$ and $A = \{1, 2\}$, $B = \{1, 3\}$, $C = \{1, 4\}$. Assume the outcomes are equiprobable. Are *A* and *B* independent? Are *A* and *C* independent events?
13. Player *A* and *B* practice shots at penalty in free time. *A* succeeds with probability p_a and *B* with probability p_b such that the probabilities are independent. Find the probability of the following outcomes when *A* and *B* each take one shot: *A* scores; Either *A* or *B* scores; both score; both miss.
14. Suppose that five numbers are selected at random from the interval [3, 6]. Find the probability that the first three numbers are less than 5 and the last two numbers are greater than 4.
15. Suppose that a dice is rolled four times. We assume that the outcomes are independent and the dice is fair. Find the probabilities of 0, 1, 2, 3 and 4 sixes.

16. A student needs eight chips of a certain type to build a circuit. It is known that 5% of these chips are defective. How many chips should he buy for there to be a greater than 90% probability of having enough chips for the circuit? (Use Binomial Probability Law and consider $n = 8, 9, ...$)
17. What is the probability of getting a six on the third attempt if you roll a fair dice?
18. Three employees work in a restaurant, including a cook and 2 waiters. The restaurant can be open only if the cook and at least one waiter are available (not on leave) on a given day. The probability that the cook is not available on a given day is 0.15 and that a waiter is not available is 0.25. All the employees go on leave independently of each other. What is the probability that the restaurant is open on a given day? What would be the probability that the restaurant is open on a given day if another cook is employed?
19. In a student hostel, students are allowed to go to bed and sleep in the afternoon after 2 o'clock but they have to wake up before 4 o'clock. Let x be the time a student goes to bed and y the time he wakes up. Find the sample space if the outcome consists of pair (x, y) and sketch it on x-y plane. Specify and sketch an event A such that the student is awake before 3 o'clock. Specify and sketch an event B such that the student sleeps more than one hour. Are A and B independent?