

Assignment 1, PME, 4th Semester, Spring 2022

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. Suppose we have 4 shirts of 4 different colors and 3 pants of different colors. How many different outfits are there?
2. How many different license plate numbers with 3 letters followed by 3 numbers are possible?
3. How many ways can one arrange 4 math books, 3 chemistry 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?
4. Suppose there are 8 men and 8 women. How many ways can we choose a committee that has 2 men and 2 women?
5. 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?
6. 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.
7. 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.
8. 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.
9. 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 $n = 8, 9, \dots$)
10. What is the probability of getting a six on the third attempt if you roll a fair dice?
11. 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?
12. 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?