Assignment

Step 2: Maths (Week 5-8)
Week 5: Statistics Basics - Descriptive Statistics
Q1. Create a NumPy array of 10 random integers between 1 and 100. Find its mean.
Q2. Calculate the median of the array:
[10, 5, 8, 12, 3, 7].
Q3. Generate an array of 15 random numbers between 1 and 50. Find its standard deviation.
Q4. Create a 3x3 array with values from 1 to 9. Find the row-wise mean.
Q5. For the array
[4, 6, 8, 10, 12], calculate mean, median, std.
Q6. Generate a 5x5 NumPy array of random integers (0 to 100). Find the overall mean.
Q7. Create an array of 50 random integers and calculate the standard deviation.
Q8. Find indices of non-zero elements from
[1,2,0,0,4,0].
Q9. You have an 2D array, print array element
[[7,4]].
Q10. Create 2 array of 2-Dimension and then perform matrix multiplication on them.

Assignment

Week 6: Probability & Combinatorics

Q1. A dice is thrown once. Find the probability of getting a 2 or 5.

Q2. A card is drawn from a deck of 52 cards. Find the probability of getting a red card or a king.

Q3. A number is chosen from 1 to 10. Find the probability that the number is even or divisible by 3.

Q4. In a bag, there are 3 red and 2 blue balls. A ball is drawn randomly. Find the probability of getting a red ball or a blue ball.

Q5. A spinner has 6 equal parts numbered 1 to 6. Find the probability of spinning a 1 or 6.

Q6. A card is drawn twice with replacement. Find the probability that both cards are spades.

Q7. A card is drawn from a deck and not replaced, then another card is drawn. Find the probability that both are aces.

Q8. A coin is tossed twice. Find the probability of getting head on both tosses.

Q9. A dice is rolled twice. Find the probability that first die shows 3 and second die shows an even number.

Q10. A bag contains 4 white and 2 black balls. Two balls are drawn without replacement. Find the probability that both are black.

Q11. A coin is tossed once. Find the probability of getting a tail.

Q12. A dice is thrown once. Find the probability of getting a number greater than 4.

Q13. A card is drawn from a deck. Find the probability that it is a queen or a red card.

Q14. A box contains 2 red, 3 blue, and 5 green balls. One ball is drawn. Find the probability that it is green.

Q15. A dice is rolled twice. Find the probability that both numbers are odd.

Q16. A coin is tossed 3 times. Find the probability of getting exactly 2 heads.

Q17. A bag has 4 yellow and 1 black ball. A ball is drawn and not replaced, then another ball is drawn. Find the probability that both balls are yellow.

Q18. Two cards are drawn together from a deck. Find the probability that both are kings.

Q19. A spinner with 4 equal sections numbered 1 to 4 is spun twice. Find the probability that both spins show the same number.

Q20. A box has 5 red and 5 blue balls. One ball is drawn at random. Find the probability that it is not blue.

Assignment

Week 7: Inferential Statistics - Hypothesis Testing

Q1. A coin is tossed 50 times and shows 30 heads. State the null and alternate hypotheses to check if the coin is fair.

Q2. A factory claims its bulbs last 1000 hours on average. Formulate the null and alternate hypotheses for testing this claim.

Q3. A new teaching method is applied to a class. Formulate hypotheses to test whether the new method improves average student marks.

Q4. A company claims 40% of customers prefer online shopping. Formulate hypotheses to test this claim.

Q5. If a hypothesis test gives p-value = 0.03 and α=0.05, should you reject the null hypothesis?

Q6. If a test gives p-value = 0.15 and α=0.05, what is your decision about the null hypothesis?

Q7. Explain what it means if p-value < α in hypothesis testing.

Q8. If α=0.01, what is the confidence level of the test?

Q9. You have the heights of 10 male and 10 female students. Which test will you perform to check if their average heights are different?

Q10. A training program is introduced. Employee performance is measured before and after. Which T-test will check if the program improved performance?

Q11. You roll a dice 120 times and record how many times each number appears. Use a Chi-Square test to check if the dice is fair.

Q12. A chips brand claims the average packet weight is 50g. You weigh 10 random packets: [49, 52, 51, 50, 48, 49, 50, 51, 52, 50]. Use a One-Sample T-Test to check if the claim is true.

Q13. A hospital claims a new medicine has a 70% success rate. In a trial of 20 patients, 12 recovered. Use a proportion test to check if the success rate matches the claim.

Q14. A survey of 30 people records gender (Male/Female) and favorite drink (Tea/Coffee). Perform a Chi-Square test to check if drink preference depends on gender.

Q15. A factory claims its bulbs last 1000 hours on average. You test 8 bulbs:
[980, 1005, 995, 1010, 1000, 985, 1020, 990]. Use a One-Sample T-Test to verify the claim.

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