**Instructions:**

*All questions need to be attempted.*
*Write your answers on this question paper, after each question, in the space provided. The answer sheets given to you are to be used for your calculations. These sheets have to be attached to the answered question paper when you submit your paper.*

1. The marks of 16 students in a 10 mark test are:

   (**4 marks**)

   $$x = \{7, 8, 9, 7, 6, 5, 4, 7, 5, 6, 9, 10, 7, 6, 8, 6\}$$

   a. Draw a histogram for the marks (a rough sketch will do)
   b. Find the probability that a student picked at random from these 16 students has marks less than 7
   c. Find the probability that a student picked at random from these 16 students has marks more than 7

2. Find the sample mean and sample standard deviation of the following set of numbers:

   (**4 marks**)

   $$x = \{6, 8, 6, 5, 5, 6\}$$

3. Find the number of permutations of the letters $\{A, B, C, D\}$ taken 3 at a time.

   (**2 marks**)

4. Solve for x, y, z:

   (**3 marks**)

   $$x - 2y + 4z = 4$$
   $$x + 3y - 3z = 7$$

5. Out of 1,000 people in a small town 500 are members of a certain organization. Out of these 500 members in the organization 100 are men. Out of the 500 inhabitants that are not in the organization 300 are men. What is the probability that a randomly drawn man is a member of the organization?

(**3 marks**)

6. A sample of 8 scores has a mean of 10. One score is added to the sample and the mean for the resulting set of scores is 12. What was the value of the added score?

(**2 marks**)

7. Write pseudo-code to print the next 20 leap years, starting from the year 1995.

(**3 marks**)

8. A professor computed the mean, median, and mode for the exam scores from a class of $N = 20$ students. Identify which of the following statements cannot be true and explain your answer.

(**2 marks**)

    a. More than half the class had scores above the mode.
    b. More than half the class had scores above the median.
    c. More than half the class had scores above the mean.

9. In a survey of 60 people, it was found that:

     25 read Newsweek magazine, 9 read both Newsweek and Fortune,
     26 read Time, 11 read both Newsweek and Time,
     26 read Fortune, 8 read both Fortune and Time,
     3 read all three magazines
        a. Find the number of people who read at least one of the three magazines
        b. Find the number of people who read exactly one magazine.

10. On an exam with mean marks 75, you obtain a score of 80.

Would you prefer that the exam distribution had standard deviation 2 or 10?
If your score is 70, would you prefer the standard deviation to be 2 or 10?
Explain why.

(**2 marks**)

11. Find the Pearson correlation between x and y. Draw a scatter plot (a rough sketch will do).

(**4 marks**)

        x = {4, 4, 6, 5, 6, 5}
        y = {9, 11, 9, 11, 10, 10}

12. Given a set of numbers x, we can transform the set by adding a constant $a$ to all the numbers. How does this change the mean of the original set? How does it change the standard deviation of the original set?

(**4 marks**)

13. Find the point (x,y) on the graph of $y = x^2$ nearest the point (3, 3).

(**4 marks**)