AI1110 : Probability and Random Variables Assignment 3

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***Abstract*—This document provides the solution of Assignment 3 (NCERT CLASS 9 Statistics Exercise 14.4 Q.2)**

Question Exercise 14.4.2 : In a mathematics test given to 15 students, the following marks (out of 100) are recorded:

41	39	48	52	46	62	54	40	96	52
98	40	42	52	62					

TABLE I

Find the mean, median and mode of these scores.
Solution :

1) Mean of the scores : The number of students scoring a certain score is called as frequency of that score. For instance, 2 students got 52 marks then frequency of 52 marks will be 2. With this knowledge we can construct a frequency distribution table as shown below,

Marks	Frequency
39	1
40	2
41	1
42	1
46	1
48	1
52	3
54	1
60	1
62	1
96	1
98	1

TABLE II

Using this frequency distribution we will find mean(m) of the data by vector approach. We know that,

$$m = \frac{\mathbf{f}^\top \mathbf{x}}{\mathbf{1}^\top \mathbf{f}} \tag{1}$$

where,$\mathbf{f}$ is the frequency vector and $\mathbf{x}$ is the class marks vector.We can get these vectors from Table II. On solving,

$$m = 54.8 \tag{2}$$

Hence, the mean of the scores is 54.8.

2) Median of the scores: To find the median we will arrange the scores of students in ascending order, 39,40,40,41,42,46,48,52,52,52,54,60,62,96,98.
Key Concept:
   a) For a sorted data if number of observations(N) is odd, then median of the data will be $\left(\frac{N+1}{2}\right)^{th}$ observation.
   b) If the number of observations(N) is even, then median will be the mean of $\left(\frac{N}{2}\right)^{th}$ and $\left(\frac{N+2}{2}\right)^{th}$ observations.

   In this case, the number of observations is odd (15) , so the median will be $\frac{15+1}{2}^{th} = 8^{th}$ observation.

$$\implies median = 52 \tag{3}$$

   Hence, median of scores will be 52.

3) Mode of scores: To find mode of the scores,from Table II we see that 52 occur maximum number of times in the data (frequency = 3),

$$\implies mode = 52 \tag{4}$$

   Hence, mode of scores will be 52.