

Math 10 - Exercises for Lecture 2

Central Tendency and Variability Practice

Our favourite dataset : $X_1 = 1$, $X_2 = 2$, $X_3 = 3$, $X_4 = 4$, $X_5 = 5$

1. Calculate the mean of this set of data.

2. Calculate $\frac{1}{5} \sum_{i=1}^5 X_i$.

3. Calculate the median of this set of data.

4. What is the mode of this set of data? Trick question: it is possible for there to be no mode.

5. Compare the median and the mean for this set of data. Are they the same? Why or why not?

New dataset : $Y_1 = 1$, $Y_2 = 3$, $Y_3 = 7$, $Y_4 = 1$

6. Calculate the mean of this new set of data.

7. Calculate the median of this new set of data.

8. Compare the median and the mean for this set of data. Are they the same? Why or why not?

9. What is the mode of this set of data? Not a trick question this time.

10. Which one “balances the scale”? The mean or the median?

11. Which one minimizes the sum of squared deviations? The mean or the median?

12. Which one minimizes the sum of absolute deviations ? The mean or the median?

13. Consider our favourite dataset : $X_1 = 1, X_2 = 2, X_3 = 3, X_4 = 4, X_5 = 5$. Let us apply a linear transformation $Z_i = 5X_i - 2$ to each one of them. Without calculating each Z_i , can you deduce what their mean would be?

14. If I tell you the variance of our favourite dataset in question 13 is 2. Can you deduce what the variance of the Z_i s will be?

15. Problems of this kind are out of the scope of this course and will not be tested in the exam. Think about this if you are bored. **Feel free to ignore this problem otherwise**

“Suppose you have three data points $0 < S_1 < S_2 < S_3$, which are all strictly positive numbers. We know that for our course, we take the median as S_2 . Prove, or come up with a reasoning, why S_2 minimizes the sum of absolute deviations. Instead of some other real number in the interval $[S_1, S_3]$ ”.

Answers

- 1) 3
- 2) 3
- 3) 3
- 4) N.A.
- 5) The same. Symmetric/uniform distribution.
- 6) 3
- 7) 2
- 8) Not the same. Skewed.
- 9) 1
- 10) Mean
- 11) Mean
- 12) Median
- 13) Yes. Mean of Z is mean of X times 5 minus 2.
- 14) Yes. $5^2 = 25$ times 2.
- 15) Ask me?