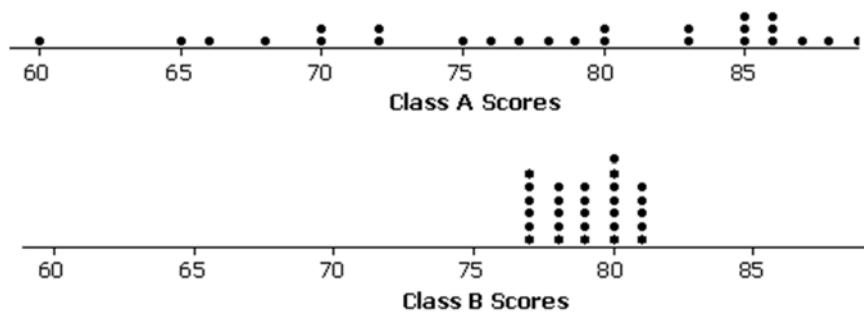


Lesson 11: Describing Distributions Using the Mean and MAD

Classwork

Example 1: Comparing Distributions with the Same Mean

In Lesson 10, a data distribution was characterized mainly by its center (mean) and variability (MAD). How these measures help us make a decision often depends on the context of the situation. For example, suppose that two classes of students took the same test and their grades (based on 100 points) are shown in the following dot plots. The mean score for each distribution is 79 points. Would you rather be in Class A or Class B if you had a score of 79?



Exercises 1–6

- Looking at the dot plots, which class has the greater MAD? Explain without actually calculating the MAD.
- If Liz had one of the highest scores in her class, in which class would she rather be? Explain your reasoning.
- If Logan scored below average, in which class would he rather be? Explain your reasoning.

Exercises 4–6

Your little brother asks you to replace the battery in his favorite remote control car. The car is constructed so that it is difficult to replace its battery. Your research of the lifetimes (in hours) of two different battery brands (A and B) shows the following data for 20 batteries from each brand:

| | | | | | | | | | | | | | | | | | | | | |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A | 12 | 14 | 14 | 15 | 16 | 17 | 17 | 18 | 19 | 20 | 21 | 21 | 23 | 23 | 24 | 24 | 24 | 25 | 26 | 27 |
| B | 18 | 18 | 19 | 19 | 19 | 19 | 19 | 19 | 20 | 20 | 20 | 20 | 20 | 21 | 21 | 21 | 21 | 22 | 22 | 22 |

- To help you decide which battery to purchase, start by drawing a dot plot for each brand.
- Find the mean battery life for each brand and compare them.
- Looking at the variability of each data set shown in its dot plot, give one reason you would choose Brand A. What is one reason you would choose Brand B? Explain your reasoning.

Example 2: Comparing Distributions with Different Means

You have been comparing distributions that have the same mean, but different variability. As you have seen, deciding whether large variability or small variability is best depends on the context and on what is being asked. For example, in Exercise 2, Liz preferred to be in the distribution with more variability because she had one of the highest scores in the class. Thus, her score would have been higher had she been in Class A than had she been in Class B. Logan, on the other hand, preferred the class with lesser variability (i.e., Class B), since his score was below average.

If two data distributions have different means, how does a measure of variability play a part in making decisions?

Exercises 7–9

Suppose that you wanted to answer the following question: Are field crickets better predictors of atmospheric temperature than katydids are? Both species of insect make chirping sounds by rubbing their front wings together.

The following data are the number of chirps (per minute) for 10 insects each. All the data were taken on the same evening at the same time.

| Insect | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|----------|----|----|----|----|----|----|----|----|----|----|
| Crickets | 35 | 32 | 35 | 37 | 34 | 34 | 38 | 35 | 36 | 34 |
| Katydid | 66 | 62 | 61 | 64 | 63 | 62 | 68 | 64 | 66 | 64 |

7. Draw dot plots for these two data distributions using the same scale, going from 30 to 70. Visually, what conclusions can you draw from the dot plots?

8. Calculate the mean and MAD for each distribution.

Lesson Summary

This lesson focused on comparing two data distributions based on center and variability. It is important to consider the context when comparing distributions. In decision-making, drawing dot plots and calculating means and MADs can help you make informed decisions.

Problem Set

1. Two classes took the same mathematics test. Summary measures for the two classes are as follows:

| | Mean | MAD |
|---------|------|-----|
| Class A | 78 | 2 |
| Class B | 78 | 10 |

- Suppose that you received the highest score in your class. Would your score have been higher if you were in Class A or Class B? Explain your reasoning.
 - Suppose that your score was below the mean score. In which class would you prefer to have been? Explain your reasoning.
2. Eight tomato plants each of two varieties, LoveEm and Wonderful, are grown under the same conditions. The numbers of tomatoes produced from each plant of each variety are shown:

| Plant | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|-----------|----|----|----|----|----|----|----|----|
| LoveEm | 27 | 29 | 27 | 28 | 31 | 27 | 28 | 27 |
| Wonderful | 31 | 20 | 25 | 50 | 32 | 25 | 22 | 51 |

- Draw dot plots to help you decide which variety is more productive.
- Calculate the mean number of tomatoes produced for each variety. Which one produces more tomatoes on average?
- If you want to be able to accurately predict the number of tomatoes a plant is going to produce, which variety should you choose – the one with the smaller MAD, or the one with the larger MAD? Explain your reasoning.
- Calculate the MAD of each plant variety.