Name: _____ Date: _____

PSTAT 5A: Homework 01

Summer Session B 2025, with *Annie Adams*

1. Consider the list of numbers $X = \{-3, -1, 0, 0.4, 0.7, 3.9, 6\}$.

(a) Compute the mean of X.

$$\bar{x} = \frac{1}{7}[(-3) + (-1) + (0) + (0.4) + (0.7) + (3.9) + (6)] = \frac{1}{7} \cdot 7 = 1$$

(b) Compute median(X), the median of X.

$\{-3, -1, 0, 0.4, 0.7, 3.9, 6\}$. $\Rightarrow$ $median(X) = 0.4$

(c) Compute the standard deviation of X.

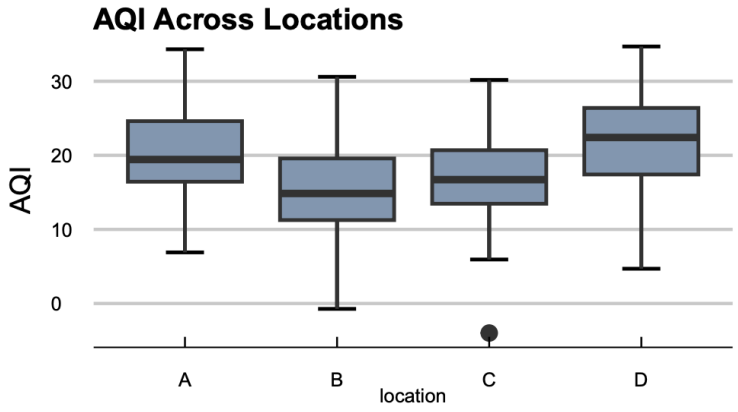
$$s_x^2 = \frac{1}{7-1}\sum_{i=1}^{7}(x_i - \bar{x})^2$$
$$= \frac{1}{6}[(-3-1)^2+(-1-1)^2+(0-1)^2+(0.4-1)^2+(0.7-1)^2+(3.9-1)^2+(6-1)^2]$$
$$= \frac{1}{6} \cdot \frac{2743}{50} = \frac{2743}{300}$$

Therefore, the standard deviation is $\sqrt{\frac{2743}{300}} = \frac{\sqrt{8229}}{30} \approx 3.023795$

(d) Compute the range of X .

$$range(X) = max\{X\} - min\{X\} = 6 - (-3) = 9$$

2. A researcher has collected measurements on the AQI (Air Quality Index) at several locations in Santa Barbara. She has labeled her locations A through D, and collected 100 AQI measurements from each location. The results of her study are displayed graphically below:



(a) What is the (approximate) median AQI at location A?

We know that, on a boxplot, the median is depicted by the dark bar in the middle of the box. As such, we see that the median AQI at location A is around 20 .

(b) Approximately what percent of AQI readings at Location D were less than 16?

We know that, on a boxplot, the first quartile is depicted by the bottom of the box. This means that the first quartile of AQI readings at location D is around 16, meaning around 25% of AQI readings at Location D were less than 16.

(c) Are there any outliers at any of the locations?

Outliers are depicted by points/circles outside of the reach of the whiskers. Only Location C has such points, meaning only Location C had outliers.

(d) From the plot, does it appear that the different locations have different AQI readings? Explain briefly.

It does appear that the average AQI readings in the different locations are different. Specifically, it seems that Locations B and C have slightly lower average AQI readings than Locations A and D.