

1. Problem

From a very large population, a small sample of measurements was taken.

| | | | | |
|----|----|----|----|----|
| 57 | 56 | 44 | 41 | 50 |
|----|----|----|----|----|

Please calculate the average absolute deviation using the following formula:

$$AAD = \frac{\sum |x - \bar{x}|}{n}$$

Solution

We fill out the table column by column.

| x | $x - \bar{x}$ | $ x - \bar{x} $ |
|------------------|--------------------|-----------------------------|
| 57 | 7.4 | 7.4 |
| 56 | 6.4 | 6.4 |
| 44 | -5.6 | 5.6 |
| 41 | -8.6 | 8.6 |
| 50 | 0.3999999999999999 | 0.4 |
| ===== | ===== | ===== |
| $\sum x = 248$ | | $\sum x - \bar{x} = 28.4$ |
| $\bar{x} = 49.6$ | | |

We are ready for the formula.

$$s = \frac{\sum |x - \bar{x}|}{n}$$

$$= \frac{28.4}{5}$$

$$= \boxed{5.68}$$

2. Problem

From a very large population, a small sample of measurements was taken.

| | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|
| 189 | 183 | 196 | 175 | 180 | 190 | 175 |
|-----|-----|-----|-----|-----|-----|-----|

Please calculate the (Bessel corrected) sample standard deviation using the following formula:

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

Solution

We fill out the table column by column.

| x | $x - \bar{x}$ | $(x - \bar{x})^2$ |
|-----------------|---------------|------------------------------|
| 189 | 5 | 25 |
| 183 | -1 | 1 |
| 196 | 12 | 144 |
| 175 | -9 | 81 |
| 180 | -4 | 16 |
| 190 | 6 | 36 |
| 175 | -9 | 81 |
| ===== | ===== | ===== |
| $\sum x = 1288$ | | $\sum (x - \bar{x})^2 = 384$ |
| $\bar{x} = 184$ | | |

We are ready for the formula.

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n - 1}}$$

$$= \sqrt{\frac{384}{7 - 1}}$$

$$= \sqrt{64}$$

$$= \boxed{8}$$