Statistics

Lecture 7

Feb 19-8:47 AM

Box Your Final Ans.

Class Quiz 1

A Sample has a minimum value of 10 and a maximum value of 60.

1) find its range. Range = Max − Min = 60 − 10 = 50

2) find class width for 4 classes.

$\frac{\text{Range}}{4} = \frac{50}{4} = 12.5$ CW = 13

3) find class width for 5 classes

$\frac{\text{Range}}{5} = \frac{50}{5} = 10$ CW = 11

Sep 5-8:43 AM

Consider the Sample below

1 5 9 13

1) $n = 4$

2) Range $= 13 - 1 = 12$

3) Midrange $= \frac{13+1}{2} = 7$

4) Mode None

5) $\sum x = 1 + 5 + 9 + 13 = \boxed{28}$

6) $\sum x^2 = 1^2 + 5^2 + 9^2 + 13^2 = \boxed{276}$

7) $\bar{x} = \frac{\sum x}{n} = \frac{28}{4} = \boxed{7}$

↑ Sample Mean

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

↑ Sample Variance $= \frac{4 \cdot 276 - 28^2}{4(4-1)}$

$= \frac{320}{12} = 26.\overline{6}$

$\approx \boxed{26.667}$

Sep 5-8:58 AM

Given $n = 8$, $\sum x = 64$, $\sum x^2 = 512$

Find

1) $\bar{x} = \frac{\sum x}{n} = \frac{64}{8} = \boxed{8}$

2) $s^2 = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \frac{8 \cdot 512 - 64^2}{8(8-1)}$

$= \frac{0}{56} = \boxed{0}$

$\emptyset$ Not Zero

Sep 5-9:10 AM

$x \rightarrow$ Data element , $n \rightarrow$ Sample Size

$\bar{x} \rightarrow x$-bar $\rightarrow$ Sample Mean (Average)

$s^2 \rightarrow$ Sample Variance

$s \rightarrow$ Sample Standard deviation

$$\bar{x} = \frac{\sum x}{n}$$

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

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

$$s = \sqrt{s^2}$$

Sep 5-9:15 AM

Consider the Sample below

2 3 3 3 4

1) $n = 5$

2) $\sum x = 15$

3) $\sum x^2 = 47$

4) $\bar{x} = \frac{\sum x}{n} = \frac{15}{5} = \boxed{3}$

5) $s^2 = \frac{n\sum x^2 - (\sum x)^2}{n(n-1)} = \frac{5 \cdot 47 - 15^2}{5(5-1)} = \frac{10}{20} = \boxed{.5}$

6) $s = \sqrt{s^2} = \sqrt{.5} \approx \boxed{.707}$

Sep 5-9:19 AM

Consider the Sample below

1 2 2 3 3 5 5 7

1) $n = 8$

2) Range $= 7 - 1 = 6$

3) Midrange $= \frac{7+1}{2} = 4$

4) Mode $= 2, 3, 5$

5) $\Sigma x = 28$

6) $\Sigma x^2 = 126$

7) $\bar{x} = \frac{\Sigma x}{n} = \frac{28}{8} = \boxed{3.5}$ ← Mean

8) $s^2 = \frac{n\Sigma x^2 - (\Sigma x)^2}{n(n-1)}$ ← Variance

$= \frac{8 \cdot 126 - 28^2}{8(8-1)}$

$= \frac{224}{56} = \boxed{4}$

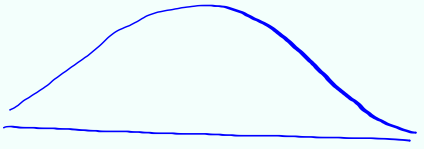
9) $s = \sqrt{s^2} = \sqrt{4}$

$= \boxed{2}$

↑ Standard deviation

Sep 5-9:26 AM

When mean = Mode = Median, then data distribution is symmetric and bell-shape.



Empirical Rule:

68% Range $\Rightarrow \bar{x} \pm s$

95% Range $\Rightarrow \bar{x} \pm 2s$ Usual Range

99.7% Range $\Rightarrow \bar{x} \pm 3s$

Sep 5-9:35 AM

I randomly selected 80 exams, scores were in bell-shape dist. with $\bar{x}=82$ and $S=6$.

68% Range $\Rightarrow \bar{x} \pm S = 82 \pm 6$

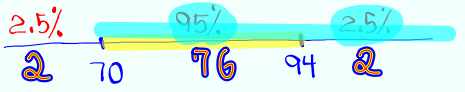
$\Rightarrow$ 76 to 88

95% Range $\Rightarrow \bar{x} \pm 2S = 82 \pm 2(6)$

$= 82 \pm 12$

$\Rightarrow$ 70 to 94

Usual Range



How many of scores were between 70 & 94?

95% of 80 = .95(80) = 76

What % of scores were above 70?

95% + 2.5% = 97.5%

Sep 5-9:38 AM

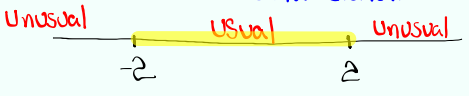
Z Score

Always round to 3-decimal places.

$$Z = \frac{x - \bar{x}}{S}$$

If $-2 \le Z \le 2$, data element is usual.

If $Z < -2$ or $Z > 2$, data element is unusual



Z Score is one way to standardize data elements.

We use Z-Score to compare data elements from different samples.

Z Score indicates how many standard deviation is the data element from the mean.

Sep 5-9:47 AM

Maria got 88 on exam 1.

$\bar{x} = 80$, $S = 5$

$Z = \frac{x - \bar{x}}{S} = \frac{88 - 80}{5}$

$= \frac{8}{5} = 1.6$

Usual Score

Maria got 80 on exam 2.

$\bar{x} = 70$, $S = 4$

$Z = \frac{x - \bar{x}}{S} = \frac{80 - 70}{4}$

$= \frac{10}{4} = 2.5$

Unusual Score

Sep 5-9:53 AM

Lisa makes \$5200/mo. as a nurse.

$\bar{x} = 6000$, $S = 250$

below $\bar{x}$

$Z = \frac{x - \bar{x}}{S} = \frac{5200 - 6000}{250} = \frac{-800}{250} = -3.2$

Unusual Salary

Sep 5-9:57 AM