SOC 4930/5050

Anscombe's Quartet - x_1 Replication

[1] X	[3] $\bar{X}$	[4] $X - \bar{X}$	[6] $(X-\bar{X})^2$
4.0	9.0	-5.0	25.0
5.0	9.0	-4.0	16.0
6.0	9.0	-3.0	9.0
7.0	9.0	-2.0	4.0
8.0	9.0	-1.0	1.0
9.0	9.0	0.0	0.0
10.0	9.0	1.0	1.0
11.0	9.0	2.0	4.0
12.0	9.0	3.0	9.0
13.0	9.0	4.0	16.0
14.0	9.0	5.0	25.0

[5] $\sum (x-\bar{x}) = 0.0$

[7] $SS = \sum (x-\bar{x})^2 = 110$

[2] Question ①

$\text{median} = \frac{n+1}{2} = \frac{11+1}{2} = \frac{12}{2} = 6^{th}$ observation

The 6th observation when arranged from low to high is 9.0

[3] Question ② mean

$\bar{X} = \frac{\sum_{i=1}^{n} X}{n} = \frac{4+5+6+7+8+9+10+12+13+14}{11} = \frac{99}{11} = 9.0$

The mean of x_1 is 9.0

[8] variance

$S^2 = \frac{\sum (x-\bar{x})^2}{n-1} = \frac{110}{11-1} = \frac{110}{10} = 11$

[9] Question ③ - standard deviation

$S = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}} = \sqrt{11} = 3.3166247904 = 3.317$

The standard deviation of x_1 is 3.317.

[10] Question ④ - Range

$14.0 - 4.0 = 10.0$

The range of x_1 is 10.0.

[11] Question ⑤ - Inter-quartile Range

$11.5 - 6.5 = 5.0$

The inter-quartile range for x_1 is 5.0

EOC 4930/5050

Anscombe's Quartet - y_1 Replication

[1] x	[2] $\bar{x}$	[4] $x-\bar{x}$	[6] $(x-\bar{x})^2$
4.26	7.500909091	-3.24090909	10.50349174
11.82	7.500909091	-2.68090909	7.187273554
5.68	7.500909091	-1.82090909	3.315709917
6.95	7.500909091	-0.55090909	0.303500826
7.24	7.500909091	-0.26090909	0.068073554
7.58	7.500909091	0.07909091	0.006255372
8.04	7.500909091	0.53909091	0.290619008
8.33	7.500909091	0.82909091	0.687391736
8.81	7.500909091	1.30909091	1.713719008
9.96	7.500909091	2.45909091	6.047128099
10.84	7.500909091	3.33909091	11.14952809

[5] $\sum E = \sum \varepsilon = 0.0$

[7] $SS_\varepsilon = 41.27269091$

[8] variance

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

$$s^2 = \frac{41.27269091}{11-1}$$

$$s^2 = \frac{41.27269091}{10}$$

$$s^2 = 4.127269091$$

[9] Question (3) - standard deviation

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

$$s = \sqrt{4.127269091}$$

$$s = 2.031568136$$

$$s = 2.032$$

The standard deviation of y_1 is 2.032

[2] Question (1)

$$\text{median} = \frac{n+1}{2} = \frac{11+1}{2} = \frac{12}{2} = 6^{\text{th}} \text{ observation}$$

The 6th observation - when ordered low to high - is 7.58.

[3] Question (2)

$$\bar{x} = \frac{\sum x}{n} = \frac{4.26 + 4.82 + 5 \cdots 8.33 + 8.81 + 9.96 + 10.84}{11} = \frac{82.51}{11}$$

$$\bar{x} = 7.500909091$$

$$\bar{x} = 7.501$$

The mean of y_1 is 7.501.

[10] Question (4) - Range

$10.84 - 4.26 = 6.58$

The range of y is 6.58.

[11] Question (5) - IQR

$8.57 - 6.315 = 2.255$

The inter-quartile range of y_1 is 7.255.