

Ex 145

2. Data arranged in ascending order

4, 6, 9, 11, 12, 14, 17

The range is between 4 - 17 $= 17 - 4 = 13$

4. Range and IQR

Arranged data

8, 9, 10, 10, 11, 12, 13, 23

Date	8	9	10	10	11	12	13	23
Rank	1	2	3.5	3.5	5	6	7	8

$$\text{Range} = 8 - 23 = 23 - 8 = 15$$

$$IQR = Q_3 - Q_1$$

$$Q_3 \Rightarrow k = \frac{3}{4} \times (8+1) = 6.75$$

$$Q_3 = 12 + (6.75 - 6)[13 - 12] \\ = 12.75$$

$$Q_1 \Rightarrow k = \frac{1}{4} (8+1) = 2.25$$

$$Q_1 = 9 + \overset{0.25}{\cancel{0.25}} (10 - 9) \\ = \overset{9}{10} . 25 = 9.25$$

$$IQR = Q_3 - Q_1 = 12.75 - 9.25 = 3.5$$

6. No, the values are always positive

8. 6, 10, 4, 2, 3

SS =

$$\bar{X} = \frac{1}{5} (6 + 10 + 4 + 2 + 3)$$

$$\bar{X} = 3$$

X	$x - \bar{x}$	$(x - \bar{x})^2$
6	3	9
0	-3	9
4	1	1
2	-1	1
3	0	0

$$\bar{x} = 20$$

$$SS = 20$$

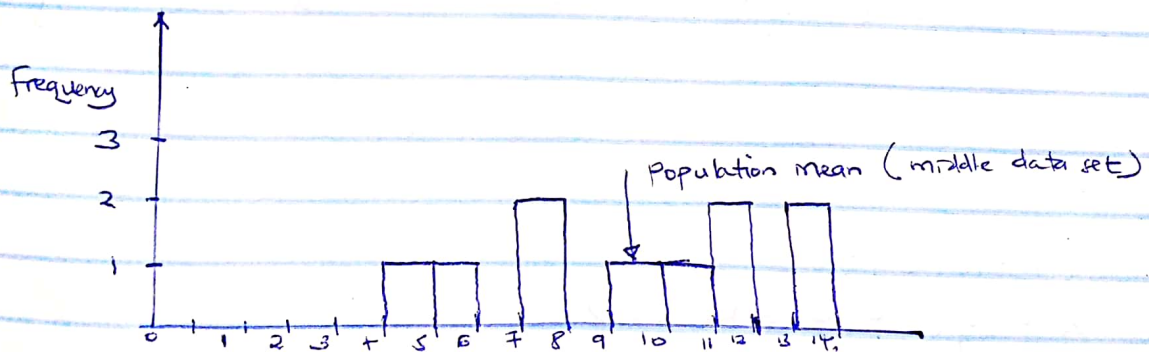
$$\sigma^2 = SS/n = 20/5 = 4$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{4} = 2$$

10. (a) When the data is ungrouped
 (b) When using a frequency distribution table for grouped data.

12. $N = 10$

5, 6, 8, 8, 10, 11, 12, 12, 14, 14



b) $S_{\#} = \frac{\max - \min}{4} = \frac{14 - 5}{4} = 2.25$

c) SS

$$\bar{X} = 10$$

X	$X - \bar{X}$	$(X - \bar{X})^2$
5	-5	25
12	2	4
14	4	16
6	-4	16
14	4	16
8	-2	4
11	1	1
8	-2	4
12	2	4
10	0	0

$$\sum = 90$$

$$SS = 90$$

$$\text{Variance} = SS/n = 90/10 = 9$$

$$\sigma = \sqrt{\sigma^2} = \sqrt{9} = 3$$

The estimate is less than the actual standard deviation by 0.7

14. 8, 1, 4, 3, 5, 3, 4

$$\bar{X} = \frac{1}{7}(8+1+4+3+5+3+4) = 4$$

X	$X - \bar{X}$	$(X - \bar{X})^2$
8	4	16
1	-3	9
4	0	0
3	-1	1
5	1	1
3	-1	1
4	0	0
		$\sum = 28$

$$SS = 28$$

$$\text{Variance} = SS/n$$

$$= 28/7 = 4$$

$$\text{Standard deviation} = \sqrt{\text{Variance}}$$

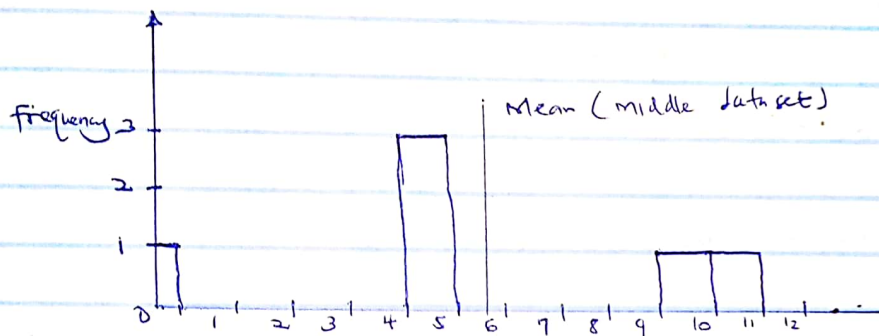
$$= \sqrt{4} = 2$$

16. This allows us to compensate for lack of information about the rest of the population when dealing with samples.

That will make the population variance larger than the sample variance which should not be the case.

18. $n = 6$

0, 11, 5, 10, 5, 5



$$\text{Standard deviation} = \frac{\text{Max} - \text{Min}}{4} = \frac{11 - 0}{4} = 2.75$$

x	$x - \bar{x}$	$(x - \bar{x})^2$
0	-6	36
11	5	25
5	-1	1
10	4	16
5	-1	1
5	-1	1

$$\bar{x} = \frac{1}{6}(0 + 11 + 5 + 10 + 5 + 5) = 6$$

$$\Sigma = 80$$

$$SS = 80$$

$$\text{Variance} = \frac{SS}{n-1} = \frac{80}{5} = 16$$

$$\text{Standard deviation} = \sqrt{\text{Var}} = \sqrt{16} = 4, \text{ the 2 values are close}$$

20. $n = 5$

2, 9, 5, 5, 9

$$\bar{x} = \frac{1}{5} (2 + 9 + 5 + 5 + 9) = 6$$

x	$x - \bar{x}$	$(x - \bar{x})^2$
2	-4	16
9	3	9
5	-1	1
5	-1	1
9	3	9

$$\sum = 36$$

$$SS = 36$$

$$\text{Variance} = SS / n - 1 = 36 / 4 = 9$$

$$\text{Standard deviation} = \sqrt{\text{Var}} = \sqrt{9} = 3$$