

Exercise 1-3:

Midterm Examination Scores									
— 44	35	20	40	38	52	29	36	38	38
— 38	38	41	35	42	50	31	43	30	37
— 32	47	43	41	47	32	38	29	41	26
— 41	51	48	49	37	26	34	48	23	29
— 38	47	41	33	39	48	38	20	48	34
— 29	44	29	33	35	50	41	38	35	35
— 32	26	24	38	38	56	56	48	41	29
— 26	26	38	37	44	24	44	47	32	41

1. In the table below, fill in the mean for the midterm examination scores above.
2. In the table below, fill in the median for the midterm examination scores above.
3. In the table below, fill in the mode for the midterm examination scores above.
4. Which measure of centre would be the best one to use?

Measure	Value	Preferred?
Mean	37.7	✓
Median	38	
Mode	38	

$$\text{Mean} = \frac{\sum x}{n} = \frac{\begin{matrix} \text{(Row 1)} & \text{(Row 2)} & \text{(Row 3)} & \text{(Row 4)} & \text{(Row 5)} & \text{(Row 6)} & \text{(Row 7)} & \text{(Row 8)} \\ 370 & + 385 & + 376 & + 386 & + 386 & + 369 & + 388 & + 359 \end{matrix}}{80} = \frac{3019}{80} = 37.7$$

Median: 20 20 23 24 24 26 26 26 26 26 29 29 29 29 29 29 30 31 32 32 32 32
33 33 34 34 35 35 35 35 35 36 37 37 37 38 38 38 38 38 38 38 38
38 38 38 39 40 41 41 41 41 41 41 41 41 42 43 43 44 44 44 44 47 47
47 47 48 48 48 48 48 49 50 50 51 51 52 56 56

There is an even number of elements (80) so the median is half way between the 40th and 41st element. Both of these are 38, so the median is 38.

Mode: The most commonly-occurring number is 38.

Mean: 37.7 Median: 38 Mode: 38

The mean is the preferred measure because the data is normal.

Exercise 4:

In the table below, fill in the mean, median, mode, range, variance and standard deviations for each of the following groups of scores. Carry out all calculations to three decimal places and round them correct to two places.

Classroom X

160
130
100
70
40

Classroom Y

102
101
100
99
98

Measure	Classroom X	Classroom Y
Mean	100	100
Median	100	100
Mode	Not defined	Not defined
Range	120	4
Variance	2250	2.5
Standard Deviation	47.4	1.6

$$\text{Mean}_x = \frac{160 + 130 + 100 + 70 + 40}{5} = \frac{500}{5} = 100$$

$$\text{Mean}_y = \frac{102 + 101 + 100 + 99 + 98}{5} = \frac{500}{5} = 100$$

Median is the middle number, in this case both 100

No number appears more than once, so there is no mode.

$$\text{Range}_x = 160 - 40 = 120 \quad \text{Range}_y = 102 - 98 = 4$$

$$\text{Variance} = \frac{\sum (x - \bar{x})^2}{N-1} \quad \text{Standard deviation} = \sqrt{\text{Variance}}$$

$$\begin{aligned} \text{Variance}_x &= \frac{(160-100)^2 + (130-100)^2 + (100-100)^2 + (70-100)^2 + (40-100)^2}{4} \\ &= \frac{60^2 + 30^2 + 0^2 + (-30)^2 + (-60)^2}{4} = \frac{3600 + 900 + 0 + 900 + 3600}{4} = \frac{9000}{4} = 2250 \end{aligned}$$

$$\begin{aligned} \text{Variance}_y &= \frac{(102-100)^2 + (101-100)^2 + (100-100)^2 + (99-100)^2 + (98-100)^2}{4} \\ &= \frac{2^2 + 1^2 + 0^2 + (-1)^2 + (-2)^2}{4} = \frac{4 + 1 + 0 + 1 + 4}{4} = \frac{10}{4} = 2.5 \end{aligned}$$

$$\text{SD}_x = \sqrt{\text{Variance}_x} = \sqrt{2250} = 47.4$$

$$\text{SD}_y = \sqrt{\text{Variance}_y} = \sqrt{2.5} = 1.6$$