Statistics section 1 – Unit 1 Data presentation and interpretation
Assessed homework Questions

Q1.

Keith records the amount of rainfall, in mm, at his school, each day for a week. The results are given below.

2.8 5.6 2.3 9.4 0.0 0.5 1.8

Jenny then records the amount of rainfall, x mm, at the school each day for the following 21 days. The results for the 21 days are summarised below.

$$\sum x = 84.6$$

(a) Calculate the mean amount of rainfall during the whole 28 days.

$\sum x = 2.8 + 5.6 + 2.3 + 9.4 + 0 + 0.5 + 1.8 + 84.6$

$n = 7 + 21 = 28$

$\bar{x} = \frac{\sum x}{n} = \frac{107}{28} = 3.8$

(2)

Keith realises that he has transposed two of his figures. The number 9.4 should have been 4.9 and the number 0.5 should have been 5.0. Keith corrects these figures.

(b) State, giving your reason, the effect this will have on the mean.

No effect on the mean

as $\sum x$ still equal to 107

(2)
(Total 4 marks)

Q2.

The mark, x, scored by each student who sat a statistics examination is coded using

$$y = 1.4x - 20$$

The coded marks have mean 60.8 and standard deviation 6.60

Find the mean and the standard deviation of x.

(4)

mean $\bar{y} = 1.4\bar{x} - 20$

$60.8 = 1.4\bar{x} - 20$

$\bar{x} = 57.7$

SD $\sigma_y = \frac{6.6}{1.4} = 4.71$

(Total 4 marks)

Q3.

The following table summarises the times, t minutes to the nearest minute, recorded for a group of students to complete an exam.

Time (minutes) t	11 – 20	21 – 25	26 – 30	31 – 35	36 – 45	46 – 60
Number of students f	62	88	16	13	11	10

[You may use $\sum fl^2 = 134281.25$]

(a) Estimate the mean and standard deviation of these data.

mid	15.5	23	28	33	40.5	53
fx	961	2024	448	429	445.5	530

mean $\bar{x} = \frac{\sum fx}{\sum f} = \frac{4837.5}{200} = 24.2$

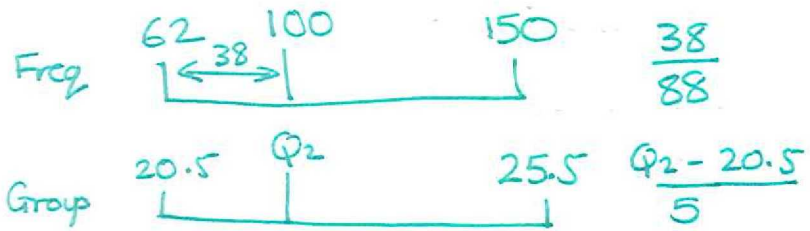
SD $= \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2} = \sqrt{\frac{134281.25}{200} - \left(\frac{4837.5}{200}\right)^2}$

$\sigma = 9.29$

(b) Use linear interpolation to estimate the value of the median.

(5)

$Q_2 = \frac{200}{2}$ th data



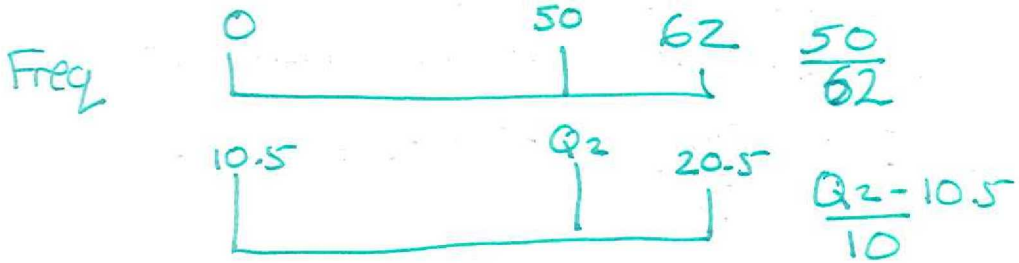
$$\frac{Q_2 - 20.5}{5} = \frac{38}{88}$$

$$Q_2 = 22.7$$

(c) Show that the estimated value of the lower quartile is 18.6 to 3 significant figures.

(2)

$Q_1 = \frac{200}{4}$ th data

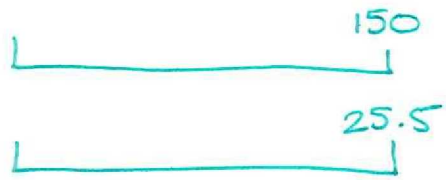


$$\frac{Q_2 - 10.5}{10} = \frac{50}{62} \quad \therefore Q_2 = 18.6$$

(1)

(d) Estimate the interquartile range of this distribution.

$Q_3 = \frac{200 \times 3}{4} = 150$



$Q_3 = 25.5$

(2)

$IQR = Q_3 - Q_1$

$= 25.5 - 18.6 = 6.9$

(e) Give a reason why the mean and standard deviation are not the most appropriate summary statistics to use with these data.

The data is skewed.

(1)

The person timing the exam made an error and each student actually took 5 minutes less than the times recorded above. The table below summarises the actual times.

Time (minutes) t	6 – 15	16 – 20	21 – 25	26 – 30	31 – 40	41 – 55
Number of students f	62	88	16	13	11	10

(f) Without further calculations, explain the effect this would have on each of the estimates found in parts (a), (b), (c) and (d).

mean - decreases

SD - remain the same

Median + Q_1, Q_2 decrease

IQR - remains the same

(3)

(Total 14 marks)