60 55

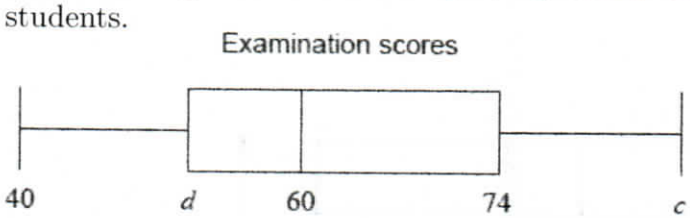
Name: Solutions

2.19 Exam: Descriptive statistics

Write your answers on the exam in the space provided. Show work as required.

1. If you have not emailed me a copy of your exploration project paper, please explain here. Include why it is late, when you plan to email it to me, and what I can do to help you.

2. The following box-and-whisker plot represents the examination scores of a group of students.



(a) Write down the median score. [1 marks]

60

The range of the scores is 54 marks, and the interquartile range is 21 marks.

(b) Find the value of

i. c; [2 marks]

$c = 40 + 54 = 94$

ii. d. [2 marks]

$d = 74 - 21 = 53$

(3)

3. Given the following set of 15 data:

3, 4, 4, 5, 5, 5, 6, 8, 9, 11, 11, 15, 15, 16, 17

(a) Write down the mode [1 marks]

5

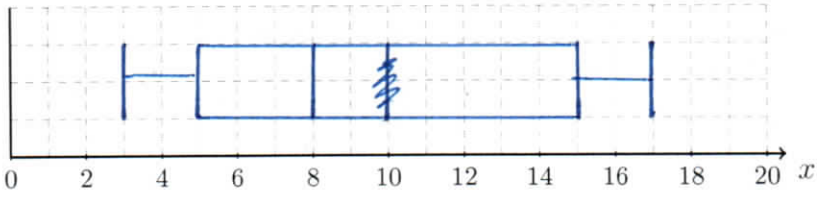
(b) Find the median. [1 marks]

8

(c) Find the interquartile range. [2 marks]

$IQR = 15 - 5 = 10$

(d) Draw a box and whiskers plot of the data on the axis below. [2 marks]



(e) Find the mean. [2 marks]

$\bar{x} = \frac{3+4+4+\ldots+17}{15} = 8.9\dot{3}$

$(\simeq 8.93)$

8

4. There are 250 high school students at BECA ranging in age from 13 to 18 years old. The following table shows the frequencies of each age.

Age (years)	13	14	15	16	17	18
Frequency	27	53	~~55~~ 60	k	43	12

(a) Write down the mode. [1 mark]

$k = 250 - (27 + \ldots + 12) = 55$ Mode $= 15$

(b) Calculate the value of k. [1 mark]

$k = 55$

(c) Find the value of the range. [1 marks]

$r = 18 - 13 = 5$

(d) Find the median. [1 marks]

15

(e) Find the mean. [2 marks]

$15.28 \quad (\approx 15.3)$

(f) Find the standard deviation. [2 marks]

$\sigma = 1.380434\ldots \approx 1.38$

(g) Four years later the same 250 people have moved on to college and career. Find the new values of the

i. mean; [1 marks]

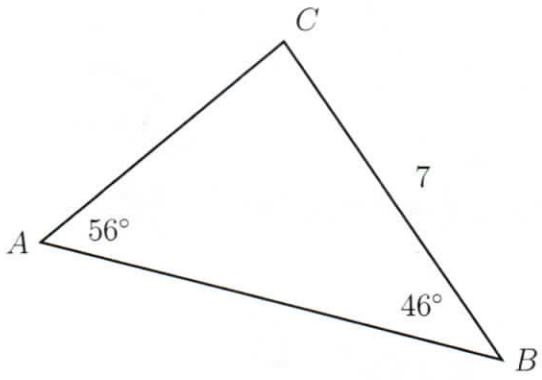
19.3

ii. standard deviation. [1 marks]

1.38

10

5. The following diagram shows triangle ABC (not drawn to scale).



$BC = 7$, $C\hat{A}B = 56°$, and $A\hat{B}C = 46°$

(a) Find the measure of $A\hat{C}B$. [1 mark]

78

(b) Find AC. [3 marks]

$$\frac{AC}{\sin 46} = \frac{7}{\sin 56}$$

$$AC = 6.07376\ldots \approx 6.07$$

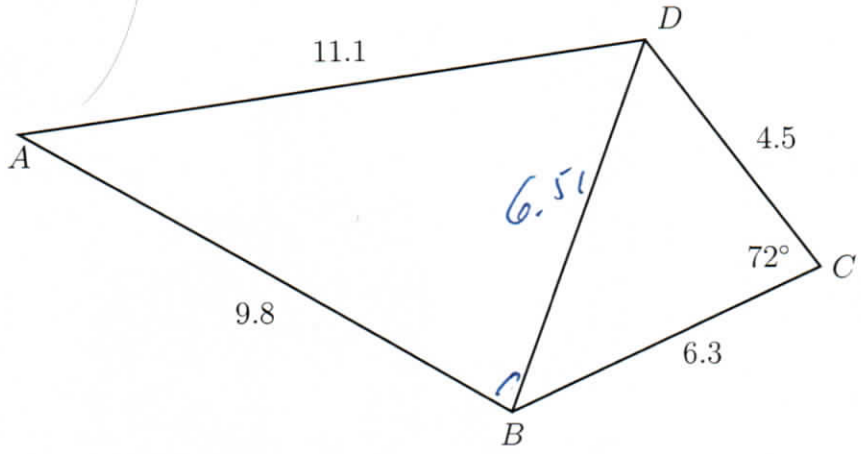
(c) Find the area of triangle ABC. [3 marks]

$$A = \frac{1}{2}(6.07)\times(7)\sin 78°$$

$$= 20.7936\ldots \quad (20.7807\ldots)$$

$$\approx 20.8$$

7. The following diagram shows quadrilateral $ABCD$ (not drawn to scale).



$AB = 9.8$, $BC = 6.3$, $CD = 4.5$, $AD = 11.1$, and $B\hat{C}D = 72°$

(a) Find BD. [3 marks]

$BD = \sqrt{4.5^2 + 6.3^2 - 2(4.5)(6.3)\cos 72°}$

$= 6.51256...$

≈ 6.51

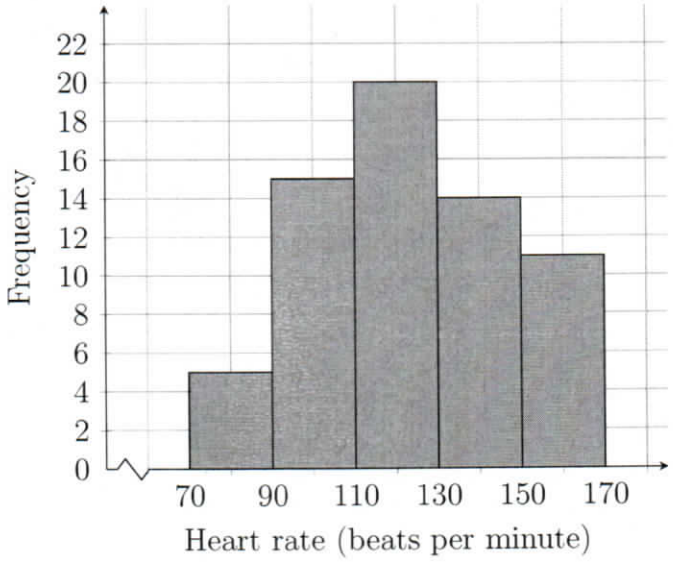
(b) Find $A\hat{B}D$. [3 marks]

$\cos A\hat{B}D = \dfrac{11.1^2 - (9.8^2 + 6.51^2)}{-2(9.8)(6.51)}$

$A\hat{B}D = 83.1576...$

≈ 83.2

6. The histogram below shows the heart rate x in beats per minute for 65 athletes after a fitness exercise.



The following is the frequency table for the distribution of x.

HR (x)	$70 \leq x < 90$	$90 \leq x < 110$	$110 \leq x < 130$	$130 \leq x < 150$	$150 \leq x < 170$
Freq	5	$p = 15$	20	14	11

(a) Write down the value of p. [1 mark]

15

(b) Write down the modal class. [2 marks]

$110 \leq x \leq 130$

(c) An athlete is selected at random. Find the probability that the athlete has a heart rate of 130 beats per minute or greater. [2 marks]

$P(x \geq 130) = \frac{11+14}{65} = \frac{25}{65}$

(d) Consider the class interval $70 \leq x < 90$.

i. Write down the interval width. [1 mark]

20

ii. Write down the mid-interval value. [1 mark]

80

(e) Hence find an estimate for the

i. mean; [2 marks]

$\bar{x} = 123.3846\ldots$
$\approx 123.$

ii. standard deviation. [2 marks]

$\sigma = 23.6823\ldots \approx 23.7$

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8. An environmental group records the numbers of coyotes and foxes in a wildlife reserve after t years, starting on 1 January 1995.

Let c be the number of coyotes in the reserve after t years. The following table shows the number of coyotes after t years.

number of years (t)	0	2	10	15	19
number of coyotes (c)	115	197	265	320	406

The relationship between the variables can be modelled by the regression equation $c = at + b$.

(a) Find the value of a and b. [3 marks]

$a = 13.3823\ldots$
≈ 13.4
$b = 137.4827\ldots$
≈ 137

(b) Find Pearson's correlation coefficient r and characterize its value. [2 marks]

$r = 0.978203\ldots$
≈ 0.978 Strongly positive

(c) Use the regression equation to estimate the number of coyotes in the reserve when $t = 7$. [3 marks]

$c = 13.3(7) + 137.48\ldots$
$= 231.158$
$\approx 231.$ $(230.1 \approx 230$ rounded$)$

8