GREENWOOD COLLEGE

YEAR 12 Applications 2016/17

Chapter 1, Test 1 Section 2

Time: 30 Minutes **calculators allowed** **one page of notes**

NAME: Solutions **Marks:** ____ /32

1. [9 marks: 1, 2, 2, 2, 2]

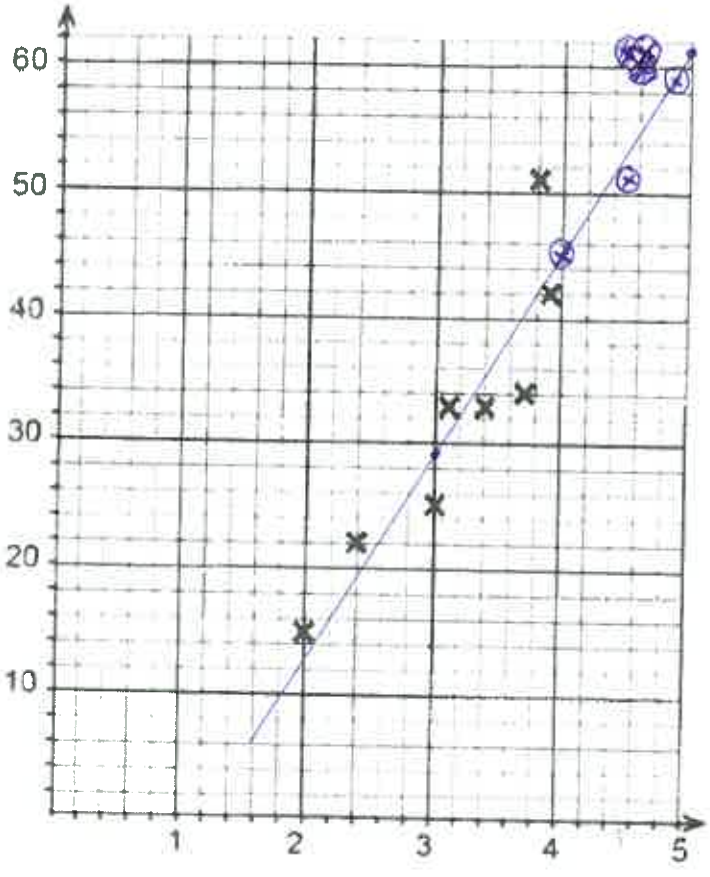
An experiment was conducted to determine whether there was any relationship between the maximum tidal current, in centimetres per second, and the tidal range, in metres, at a particular marine location. (The tidal range is the difference between the height of high tide and the height of low tide.) Readings were taken over a period of 12 days and the results are shown in the following table.

Tidal range	2.0	2.4	3.0	3.1	3.4	3.7	3.8	3.9	4.0	4.5	4.6	4.9
Maximum tidal current	15.2	22.0	25.2	33.0	33.1	34.2	51.0	42.3	45.0 ✓	50.7 ✓	61.0	59.2

a) State the explanatory variable. Tidal range ✓

b) Complete the scatterplot below by plotting the last four data points and labelling the horizontal axis and the vertical axis clearly.

all 4 correct ✓✓ (−1 for each error)



(3)

2. [8 marks: 2, 2, 4]

The accompanying diagram shows the different makes of cars parked at three different suburban shopping centres on a school-day morning. The shopping centres A, B and C are located respectively at high, middle and low income suburbs.

	A	B	C	
Australia	70	60	40	170
German	150	80	20	250
Korean	40	130	120	290
Japanese	90	140	110	340
Others	60	70	50	180
	410	480	340	

a) Complete the table below showing the row percentages.

	A	B	C
Australia	41 41.17	35 35.29	24 23.53
German	60 60	32 32	8 80
Korean	14 13.79	45 44.8	41 41.37
Japanese	26 26.47	41 41.17	32.35 32 or 33
Others	33 33.3	39 38.89	28 27.78

all 4 correct answers ✓✓

(-1 each error)

b) Complete the table below showing the column percentages.

	A	B	C
Australia	17 17.07	13 12.5	12 11.76
German	37 or 36 36.5	17 16.67	6 5.8
Korean	10 9.7	27 27.08	35 35.29
Japanese	22 21.95	29 29.16	32 32.3
Others	15 14.63	15 14.58	15 14.7

all 4 correct ✓✓

c) Determine with reasons if there is a relationship between the make of cars parked and the level of income of the suburb. Clearly identify the response and explanatory variables. State any assumptions you made.

✓ Assumptions: Being a school-day morning, car owners are local residents with respect to the shopping centres.

✓ Relationship: 60% German made cars were parked at the high income shopping centre.

✓ Variables: The most popular make of cars at the high income shopping centre were of German make (36%)

✓ Reason(s): Hence, shopping at the high income suburb favour German cars.

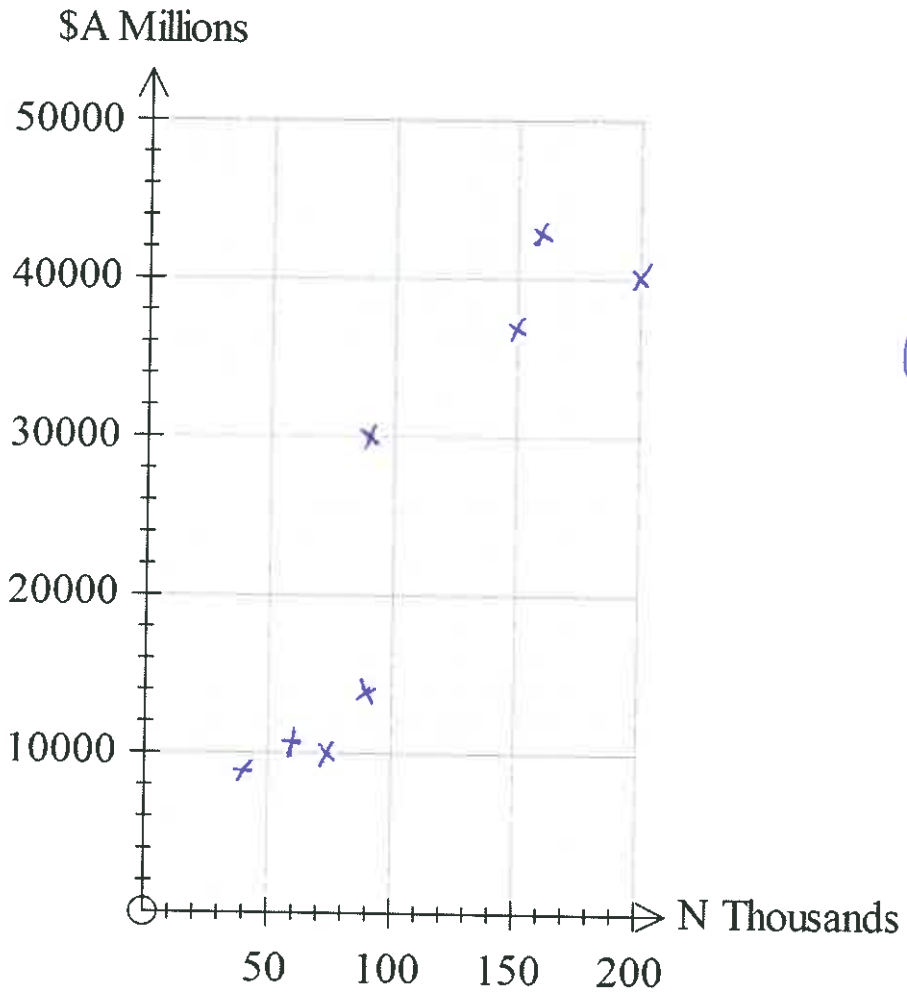
Response variable: Make of car, Explanatory variable: Income Level of suburb

3. [15 marks: 2, 3, 1, 1, 2, 3, 1, 2]

The following table displays the Number Employed (thousands) and the corresponding Annual Turnover (in $million) for several types of industry.

Type of Industry	Number Employed('000),N	Annual Turnover $m, A
Food, beverages	160	43000
Textiles	75	10000
Wood and paper	60	11000
Printing	90	14000
Energy Products	90	30000
Non-metal mineral products	40	9000
Metal products	150	37000
Machinery	200	40000

a) Draw a scatter-graph for this data.



Accuracy of all points ✓✓

$y = 240.02x - 1702.5$

$r = 0.9073$

(2)

b) Calculate the coefficient of linear correlation and comment on the nature of the relationship between **N** and **A.**

$r = 0.9073$ ✓

The relationship between N and A is a strong ✓ and positive linear ✓ relationship.

c) Find the gradient of the least squares regression line of **A** and **N**

Gradient = 240.02 ✓

d) Find the vertical intercept of the least squares regression line of **A** and **N**

Vertical intercept = −1702.50 ✓

e) Determine the increase in turnover for every 10 000 increase in the number employed.

= 240.02 × 10 ✓

= $ 2400 million ✓

f) Use the least squares regression line to predict the annual turnover for a business that employs 5 000 people.

Comment on the reliability of your prediction.

y-calc $x = 5$

When N = 5 thousand

$A = 240.02 \times 5 - 1702.50$ ✓

$= -\$502$ million ✓

−502.38

Prediction is unreliable as an extreme extrapolation is involved. ✓

g) An American reporter converts the turnover to US$ using the conversion AUD$1=US$0.70. Calculate the correlation coefficient between the Number employed and the Annual Turnover in US$.

$r = 0.9073$ (unchanged) ✓

h) Comment on the statement made by a politician that increasing the number of people employed will create a higher annual turnover.

Statement is inaccurate as there is not necessarily a cause and effect relationship between the number employed and the annual turnover. ✓✓

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