Chapter 3 Investigating and modelling linear associations: **Assignment**

Student name: _____

1 Find the values of a and b in the linear equation

$y = a + bx$

where $r = 0.67$, $\bar{x} = 112.5$, $s_x = 10.4$, $\bar{y} = 24.8$, $s_y = 3.4$

Give the values of the coefficients rounded to three decimal places.

2 Use the formula to determine the equation of the least squares regression line that allows a daughter's height (y) to be predicted from her mother's height (x) where $r = 0.62$, $\bar{x} = 164.7$, $s_x = 7.2$, $\bar{y} = 168.0$, $s_y = 8.3$.

Give the values of the coefficients rounded to three decimal places.

3 The table shows the days absent from school and the final exam score for a group of Year 12 mathematics students:

Number of days absent	Exam score
0	85
1	85
1	83
2	84
3	82
3	80
4	75
5	60
6	72
7	64
10	60

a Find the equation of the least square regression line which allows you to predict exam score from the number of says absent. Give the values of the coefficients rounded to two decimal places.

b Use the equation to predict the exam scores, rounded to one decimal place, for students with absences of:

   i. 8 days

   ii. 15 days

c How reliable are the predictions you made in part b?

4 The equation which allows us to predict the resale price of a certain model car ($) based on its age (years) is: *Resale price* = 45 560 – 5250 × *age*

a Use the regression equation to predict the resale price of car which is 5 years old.

b If the actual resale price of a 5-year-old car was $22 700, find the value of the residual.

5 Sam has determined the rule which allows him to predict the numbers of boogie boards he rents in a day, based on the maximum temperature daily temperature (°C), as follows:

Number of boogie boards rented out = –3.2 + 0.34 × *temperature*

Interpret intercept and slope of this equation in terms of the variable in the question.

6 The following table shows the residual obtained when a least squares regression line was fitted to the dataset.

x	179	183	193	173	186	188	191
y	78	85	86	76	85	85	91
pred y	78.9	82.0	89.6	74.3	84.3	85.8	88.1
residual	–0.9	3.0	–3.6	1.7	0.7	–0.8	2.9

a Use the data in the table to construct a residual plot.

b Use the residual plot to comment on the assumption that the relationship between x and y is linear.

7 The following table shows the data collected when a group of 8 people recorded the number of hours they spent reading, and the number of hours they spent watching TV one week:

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Time spent watching TV (hrs/week)	7	15	13	15	8	20	10	21
Time spent reading(hrs/week)	10	4	7	8	6	3	4	1

a Determine the value of the correlation coefficient for these data. Give your answer rounded to four decimal places.

b Determine the value of the coefficient of determination and interpret in terms of the variables in the question. Give your answers as a percentage rounded to one decimal place.

c Determine the equation of least squares regression line which will allow us to predict the number of hours a person spends reading from the number of hours they spend watching TV, giving the coefficients rounded to one decimal place.

d Interpret intercept and slope of this equation in terms of the variable in the question.

e Use regression equation to predict (rounded to one decimal place) the number of hours a person spends reading each week if the number of hours they spend watching TV each week is:
  i 12 hours
  ii 25 hours

f How reliable are the predictions you made in part c?