

Year 1 Applied Exam Questions

Chapter 3: Correlation and Regression

Q1.

An office has the heating switched on at 7.00 a.m. each morning. On a particular day, the temperature of the office, t °C, was recorded m minutes after 7.00 a.m. The results are shown in the table below.

m	0	10	20	30	40	50
t	6.0	8.9	11.8	13.5	15.3	16.1

The regression line of t on m is $t = 6.83 + 0.204m$.

- (a) Use your equation to estimate the value of t at 7.35 a.m.

(2)

- (b) State, giving a reason, whether or not you would use the regression equation in (b) to estimate the temperature

(i) at 9.00 a.m. that day,

(ii) at 7.15 a.m. one month later.

(4)

(Total 7 marks)

Q2.

The weight, w grams, and the length, l mm, of 10 randomly selected newborn turtles are given in the table below.

l	49.0	52.0	53.0	54.5	54.1	53.4	50.0	51.6	49.5	51.2
w	29	32	34	39	38	35	30	31	29	30

The equation of the regression line of w on l is $w = -60.5 + 1.8l$.

- (a) Use your regression line to estimate the weight of a newborn turtle of length 60 mm.

(2)

- (b) Comment on the reliability of your estimate giving a reason for your answer.

(2)

(Total 4 marks)

Q3.

A teacher is monitoring the progress of students using a computer based revision course. The improvement in performance, y marks, is recorded for each student along with the time, x hours, that the student spent using the revision course. The results for a random sample of 10 students are recorded below.

x hours	1.0	3.5	4.0	1.5	1.3	0.5	1.8	2.5	2.3	3.0
y marks	5	30	27	10	-3	-5	7	15	-10	20

The equation of the least squares regression line of y on x is $y = -10.7 + 9.48x$.

- (a) Give an interpretation of the gradient of your regression line.

(1)

Rosemary spends 3.3 hours using the revision course.

- (b) Predict her improvement in marks.

(2)

Lee spends 8 hours using the revision course claiming that this should give him an improvement in performance of over 60 marks.

- (c) Comment on Lee's claim.

(1)

(Total 4 marks)

Q4.

A metallurgist measured the length, l mm, of a copper rod at various temperatures, $t^\circ\text{C}$, and recorded the following results.

t	l
20.4	2461.12
27.3	2461.41
32.1	2461.73
39.0	2461.88
42.9	2462.03
49.7	2462.37

The equation of the regression line of t on l is $l = 2460 + 0.04123t$.

- (a) Estimate the length of the rod at 40°C .

(1)

- (b) Estimate the length of the rod at 90°C .

(1)

- (c) Comment on the reliability of your estimate in part (b).

(2)

(Total 4 marks)

Q5.

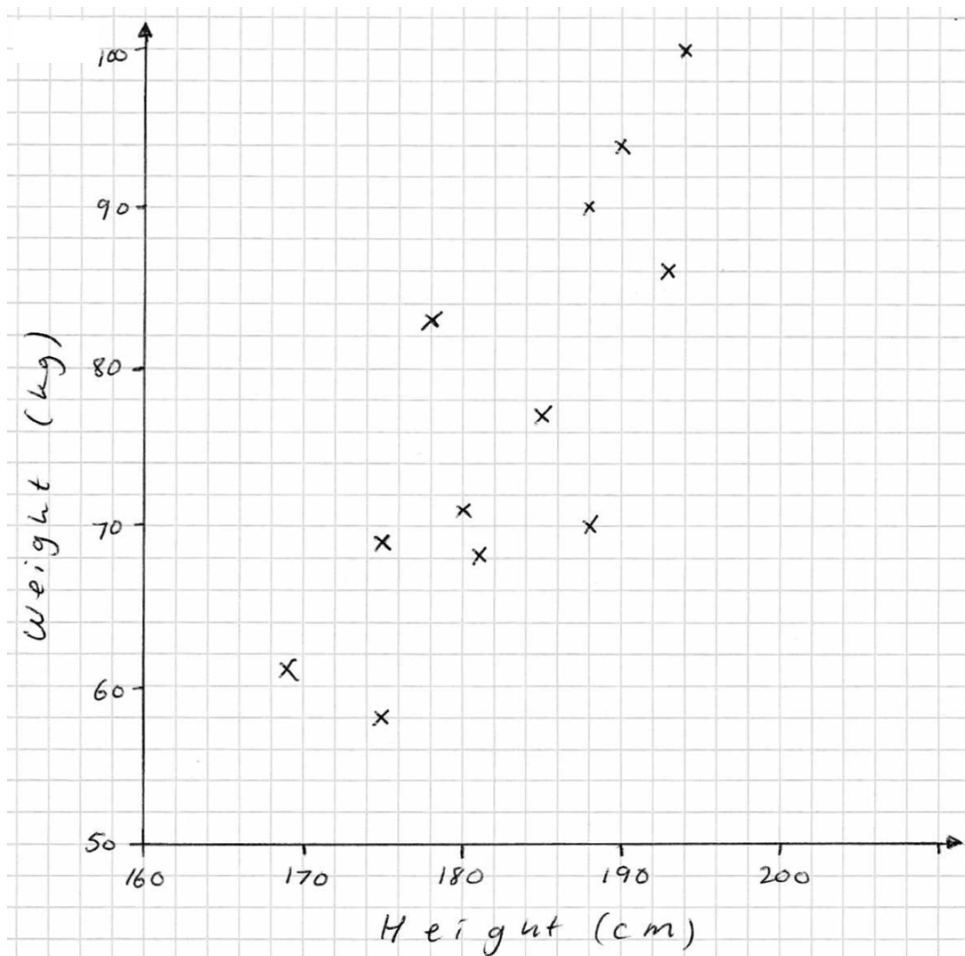
Ross did an investigation into the relationship between study into temperature (t) and total hours of sunshine (s) at Heathrow. He finds that the equation of the regression line is $s = 0.25t + 1.3$.

Give an interpretation of the figure 0.25 figure in this regression line.

(Total for question 1 is 4 marks)

Q6.

A football coach measured the heights and weights of 12 players, The data is shown below.



a) Give an interpretation of the correlation between the height and weight of the footballers.

The equation of the regression line is $w = 1.37h - 173$

b) Give an interpretation of the gradient of this regression line.

c) Use the equation of the regression line to estimate the weight of a player who is 170cm tall.

d) Comment on the reliability of your estimate in part (d), giving a reason for your answer.

(Total for question 1 is 4 marks)