Year 1 Applied Chapter 4 – Exam Questions Correlation (Total Marks 26)

1. 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)

2. 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)

3. 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)

4. A metallurgist measured the length, l mm, of a copper rod at various temperatures, t°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)