6. As a part of a selection process, applicants for a television game show have to take a test, and then complete a task as quickly as possible. The test score, w, and the time taken to complete the task, t minutes, are recorded for each applicant.

The summary statistics below represent the data for a random sample of 30 applicants.

$$S_{wt} = -1648.83 \qquad S_{ww} = 2396.97 \qquad \sum w = 839 \qquad \sum t = 635 \qquad \sum t^2 = 14\,837$$

(a) Show that the product moment correlation coefficient for these data is −0.901 to 3 significant figures.

(2)

A scatter diagram of t against w is plotted for these data.

(b) State **two** features of the graph that you would expect to see, given the correlation coefficient in part (a)

(2)

(c) Calculate the equation of the regression line of t on w in the form

$$t = a + bw$$

Give the values of the constants a and b to 3 significant figures.

(4)

(d) Give an interpretation of the gradient of this regression line.

(1)

The test score, w, was a score out of 50
The manager of the selection process now decides to double all the values of w to make them into percentages.
The manager then recalculates the product moment correlation coefficient and the equation of the regression line.

(e) State, for **each** of the following, whether the value would increase **or** decrease **or** stay the same as a result of applying this change.

(i) The product moment correlation coefficient

(ii) The magnitude of the gradient of the regression line

(iii) The t intercept of the regression line

(3)

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(Total for Question 6 is 12 marks)

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