2. The production cost, £c million, of a film and the total ticket sales, £t million, earned by the film are recorded for a sample of 40 films.

Some summary statistics are given below.

$$\sum c = 1634 \qquad \sum t = 1361 \qquad \sum t^2 = 82\,873 \qquad \sum ct = 83\,634 \qquad S_{cc} = 28\,732.1$$

(a) Find the exact value of S_{tt} and the exact value of S_{ct}

(3)

(b) Calculate the value of the product moment correlation coefficient for these data.

(2)

(c) Give an interpretation of your answer to part (b)

(1)

(d) Show that the equation of the linear regression line of t on c can be written as

$$t = -5.84 + 0.976c$$

where the values of the intercept and gradient are given to 3 significant figures.

(3)

(e) Find the expected total ticket sales for a film with a production cost of £90 million.

(2)

Using the regression line in part (d)

(f) find the range of values of the production cost of a film for which the total ticket sales are less than 80% of its production cost.

(2)

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(Total for Question 2 is 13 marks)

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