3. A publisher collects information about the amount spent on advertising, £x, and the sales, y books, for some of her publications. She collects information for a random sample of 8 textbooks and codes the data using $v = \dfrac{x + 50}{200}$ and $s = \dfrac{y}{1000}$ to give

v	0.60	8.10	4.30	0.40	1.60	6.40	2.50	5.10
s	1.84	6.73	5.95	1.30	2.45	7.46	4.82	6.25

[You may use: $\sum v = 29$ $\sum s = 36.8$ $\sum s^2 = 209.72$ $\sum vs = 177.311$ $S_{vv} = 55.275$]

(a) Find S_{vs} and S_{ss}

(3)

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

(2)

The publisher believes that a linear regression model may be appropriate to describe these data.

(c) State, giving a reason, whether or not your answer to part (b) supports the publisher's belief.

(1)

(d) Find the equation of the regression line of s on v, giving your answer in the form $s = a + bv$

(4)

(e) Hence find the equation of the regression line of y on x for the sample of textbooks, giving your answer in the form $y = c + dx$

(3)

The publisher calculated the regression line for a sample of novels and obtained the equation

$$y = 3100 + 1.2x$$

She wants to increase the sales of books by spending more money on advertising.

(f) State, giving your reasons, whether the publisher should spend more money on advertising textbooks or novels.

(2)

(Total for Question 3 is 15 marks)