1. Suppose that a random sample of five families had the following annual income and savings.

Income (X) (£'000)	Savings (Y) (£'000)
8	0.6
11	1.3
9	1.0
6	0.7
5	0.3

(a) Plot this data on an appropriate labelled scatter diagram.
(b) Obtain the least square regression equation of savings (Y) on income (X) and plot the regression line on a graph.
(c) Estimate the savings if the family income is £ 7000.

2. As part of an investigation into levels of overtime working, a company decides to tabulate the number of orders received weekly and compare this with the total weekly overtime worked to give the following:

Week number	1	2	3	4	5	6	7	8	9	10
Orders received	83	22	107	55	48	92	135	32	67	122
Total overtime	38	9	42	18	11	30	48	10	29	51

Use the method of least squares to obtain a regression line that will predict the level of total overtime necessary for 100 orders

3. The following data show weekly prices and also sales of a mail order product over a two months period.

Price (£)	Sales
8.99	496
9.50	465
9.99	482
10.50	459
10.99	408
11.50	382
11.99	315
12.50	363
12.99	309

(a) Plot this data on an appropriate labelled scatter diagram.
(b) Calculate the product moment correlation coefficient.
(c) Obtain the least square regression equation and plot the regression line on your graph.
(d) Comment on your results.

4. (a) Draw a scatter diagram of about 10 points to illustrate the following degree of linear correlation.
   (i) no correlation
   (ii) weak positive correlation
   (iii) Perfect positive correlation
   (iv) moderately strong negative correlation.

   (b) The data below shows the appraised value and area of home for a sample of seven homes.

Area (x) ('000 square feet)	value (y) ($'000)
1.8	100
1.6	96
2.5	151
2.0	121
1.2	83
1.5	94
2.4	140

   (i) Calculate the product moment correlation coefficient between the value and the area of home.
   (ii) Calculate the value of coefficient of determination and interpret the value obtained here.

5. Two supervisors, Mr A and Mr B , are considering the performance of individual employees according to their opinion of their abilities.
   (i) Find the coefficient of rank correlation for the following Employees Rankings of 10 employees by the two supervisors.

Employees	Ranking by A	Ranking by B
A	2	3
B	1	2
C	3	1
D	4	4
E	6	6
F	5	7
G	8	5
H	7	9
I	10	10
J	9	8

   (ii) Explain what this coefficient show.

6. A random sample of recent repairs was selected and the estimated time required for the repair and the actual time taken were recorded.

Estimated time(mins)	30	90	15	75	60	40	20	80	45	120
Actual time(mins)	22	64	36	61	93	45	33	65	50	90

Calculate

(a) Spearman's rank correlation coefficient
(b) The product moment correlation coefficient
(c) Explain why the two answers differ.

Answers:

1) (a) $y = 0.148x - 0.376$ (b) £660
2) 38.23
3) (b) -0.943 (c) $y = -48.81x + 945.42$
4) (b) (i) 0.981 (ii) 0.962
5) (i) 0.855
6) (a) 0.818 (b) 0.800