Exercise 11- Simple Linear Regression

1. An observation was carried out to determine the relationship between age or worker and the working time (in hours) at farm. The table below shows the data recorded ten randomly selected workers.

Age (years)	30	38	35	40	25	25	30	28	42	45
Time (hours)	8.5	8.5	9	8	9	9	8.5	9	7	5

   a) Using Pearson's coefficients of correlation, determine the relationship between the age of worker and the working time (in hours) at farm.
   b) Use the least squares method to determine the regression equation.
   c) Calculate the percentage of the total variation of working time explained by the variable age of worker.
   d) Estimate the working time for worker aged 27 years and 6 months old.

2. The tensile strength of a paper product is related to the amount of hardwood in the pulp. A researcher conducted a study to determine the relationship between the two variables. The following table give the information on tensile strength and amount of hardwood for a random sample of 10 woods.

Tensile strength	Percentage hardwood
180	58
234	85
190	65
156	55
154	50
189	60
221	78
168	54
199	70
182	61

   a) State the dependent and independent variables.
   b) What is the relationship between the two variables? Show the calculation using a suitable statistical method.
   c) Write the equation of the line that best describe the association between the independent and dependent variables. Interpret the meaning of the constant and slope values.
   d) Determine the coefficient of determination and explain its meaning.
   e) Estimate the tensile strength of a paper product if the amount of hardwood is 69 percent.

3. A group of hematologist wants to determine the relationship between the number of blood packets (’00 unit) at the blood bank in general hospital and the number of blood donors in Malaysia. The data recorded as follows.

Number of blood packet	Number of blood donors
5	250
10	510
6	290
7	315
9	400
8	410
3	170
7	325
8	430
7	360
12	580
8	380

a) State the independent and dependent variable.
b) Compute the Pearson’s product moment correlation coefficient whether there is a linear relationship between the number of blood packets (’00 unit) at the blood bank at general hospital and the number of blood donors. Interpret on the value obtained.
c) Given the regression equation is Y=-0.012+0.02X. Using an appropriate formula, show that the value of the slope is 0.02. Hence, explain the meaning of the value.
d) Predict the number of blood packets if the number of blood donor is 320.