Lab Session 4

The focus of this week is gaining experience in running the lm() function in R and understanding its results.

The data for each of the questions can be found in the file MATPMD1LabSession4Data.xlsx.

1. Consider the follow data points (x, y)

x	10	12	14	16	18	20	22	24	26	28
y	25	24	22	20	19	17	13	12	11	10

   (a) Plot the data.

   (b) Find the correlation coefficient (r) and the coefficient of determination (R^2) for this data.

   (c) Is the correlation significantly different from zero?

   (d) Find the regression line of y on x for the data.

   (e) Add the fitted line (regression line) to your graph.

   (f) Is the slope significantly different to zero?

2. During the making of certain electrical components each item goes through a series of heat processes. The length of time spent in this heat treatment is related to the useful life of the component. To find the nature of this relationship a sample of twenty components are selected from the process and tested to destruction and the results are given below. Answer the following questions:

   (a) Plot the data, find the equation of the regression line and add the fitted line to the plot

   (b) Is the regression significant?

   (c) Predict the useful life of a component which spends 33 minutes in process (add confidence and prediction intervals to your plot)

   (d) Predict the useful life of a component which spends 60 minutes in process (add confidence and prediction intervals to your plot)

   Finally, if you have time and want to consider the data further:

   (a) Find a transformation that will increase the coefficient of determination.

   (b) Repeat (a), (b), (c) and (d) for this new relationship.

   (c) In your opinion are either of the regressions 'worthwhile'?

Time in Process (minutes)	Length of Life (hours)
25	2005
27	2157
25	2239
31	2889
30	2942
32	3048
29	3002
30	2943
44	3844
41	3759
42	3810
41	3814
44	3927
31	3110
30	2999
55	4005
52	3992
49	4107
50	3987