Question 1 (Regression)

A researcher wants to study the relationship between the dosage of a medicine and the average response as measured on a sample of patients. The researcher collects data on the dosage and the response and records them in Minitab.

You are provided with a dataset called *MedicineResponseData* on Canvas, which contains the following data:

| **Worksheet column** | **Description** |
| --- | --- |
| *Response* | The average response of the sample of patients |
| *Dosage* | The dosage of medicine used |

1. Construct a scatterplot of the data and comment on the relationship between Dosage and Response.
2. Calculate the correlation coefficient and interpret it.
3. Fit a model of the form , report the fitted model and interpret the value of .
4. Calculate a 95% confidence interval for the coefficient.
5. Test the hypothesis at the 5% level of significance:

H0:

HA:

What do the results of the hypothesis test imply for the regression model?

1. Report and interpret the coefficient of determination.
2. Plot the regression line onto a scatterplot of the data and plot a 95% prediction band.
3. Plot a histogram of the residuals and comment on its shape.
4. Report whether the assumptions of linear regression are satisfied.

Question 2 (Basic Stats and ANOVA)

A teacher wants to compare the performance of 4 classes in a certain year group. There are 6 students in each class group, and each took the same exam which was marked by the teacher. This data is recorded in the *Marks\_by\_Class* dataset on Canvas.

| **Worksheet column** | **Description** |
| --- | --- |
| *Class* | The Class Group:  *A, B, C, D* |
| *Mark* | The Mark obtained by the student in the test |

1. Produce summary statistics for Mark by Class and interpret your findings.
2. Carry out a one-way ANOVA on the data to determine whether the Marks differ by Class Group.

Question 3 (Graphs and Hypothesis Tests)

A Meteorologist observes weekly rainfall and records this data in the *Rainfall* dataset.

| **Worksheet column** | **Description** |
| --- | --- |
| Rainfall | The rainfall each week in cm |

The historical weekly rainfall has been Normally Distributed with a mean of 100.

1. Verify that the rainfall data is Normally Distributed.
2. Carry out a hypothesis test of the rainfall values against the historical average rainfall at the 5% level of significance.