Consider the following data set labeled Gala, which describe the number of species of tortoise on the various Galapagos Islands. There are 30 cases (Islands) and 7 variables in the dataset:

**Species**: The number of species of tortoise found on the island

**Endemics**: The number of endemic species

**Elevation**: The highest elevation of the island (m)

**Nearest**: The distance from the nearest island (km)

**Scruz**: The distance from Santa Cruz island (km)

**Adjacent**: The area of the adjacent island (km²)

The data were presented by Johnson and Raven (1973) and also appear in Weisberg (1985).
1. In the following analysis, we consider the linear relationship between **Elevation** and **Endemics**

![Graph showing correlation between Elevation and Endemics](image)

a) What is the sample correlation between these two variables: $r =$ ____? Would you say this a strong correlation?

b) From the JMP output report the 95% confidence interval for the population correlation between **Elevation** and **Endemics**. Is this correlation statistically significant? Why or why not?
c) According to the scatterplot, do the data appear to be linear? Which variable is the dependent variable and which is the independent?

![Bivariate Fit of Endemics By Elevation](image1)

**Summary of Fit**
- R-squared: 0.62697
- R-squared Adj: 0.615437
- Root Mean Square Error: 16.9486
- Mean of Response: 25.1
- Observations (or Sum Wgt): 30

**Parameter Estimates**

<table>
<thead>
<tr>
<th>Term</th>
<th>Estimate</th>
<th>Std Error</th>
<th>t Ratio</th>
<th>Prob &gt;</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>7.1826817</td>
<td>4.130386</td>
<td>1.74</td>
<td>0.0936</td>
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<tr>
<td>Elevation</td>
<td>0.0514011</td>
<td>0.007486</td>
<td>6.89</td>
<td>&lt;0.0001</td>
<td></td>
</tr>
</tbody>
</table>

d) State the meaning of the coefficient of determination in the context of the problem?
e) Using the JMP output do a 6-step hypothesis test for the slope parameter, using a significance level of 0.05.

f) Provide the Regression equation for predicting Endemics from Elevation

g) Using the regression equation, predict the Endemics value for the following Elevation: 250, 600, and 1200. What is the error associated with these predictions?
h) Do the residuals look healthy? Why or why not?

i) Are any assumptions of the model being appear to be violated? If so, which one(s)?

2. Consider the following dataset known as stronx. These data were collected in an experiment to study the interaction of certain kinds of elementary particles on collision with proton targets. The experiment was designed to test certain theories about the nature of the strong interaction. The cross-section(crossx) variable is believed to be linearly related to the inverse of the energy(energy - has already been inverted). At each level of the momentum, a very large number of observations were taken so that it was possible to accurately estimate the standard deviation of the response(sd).

In the following analysis, we consider the linear relationship between crossx and momentum
a) What is the sample correlation between these two variables: $r = \ldots$? Would you say this a strong correlation?

b) From the JMP output report the 95% confidence interval for the population correlation between crossx and momentum. Is this correlation statistically significant? Why or why not?

c) According to the scatterplot, do the data appear to be linear? Which variable is the dependent variable and which is the independent?

d) State the meaning of the coefficient of determination in the context of the problem?
e) Using the JMP output do a 6-step hypothesis test for the slope parameter, using a significance level of 0.01.

f) Provide the Regression equation for predicting crossx and momentum

g) Using the regression equation, predict the crossx value for the following momentum values: 20, 75, and 120. What is the error associated with these predictions?
h) Do the residuals look healthy? Why or why not?

i) Are any assumptions of the model being appear to be violated? If so, which one(s)?