12.6.6 Truck Unloading Times

Consider the data set of the times taken to unload a truck at a warehouse given in DS 12.2.2. Compute the analysis of variance table and calculate the coefficient of determination R^2. Check that the F-statistic is the square of the t-statistic for testing $H_0 : \beta_1 = 0$, calculated earlier. What is the implication of the p-value in the analysis of variance table?

12.7.2 Truck Unloading Times

Consider the data set of the times taken to unload a truck at a warehouse given in DS 12.2.2. Plot the residuals against the temperature. Are there any points that might be considered to be outliers? Does the residual plot have any patterns that suggest that the fitted regression model is not appropriate? Construct and interpret a normal probability plot.

12.7.6 Vacuum Transducer Bobbin Resistances

Consider the data set of vacuum transducer bobbin resistances given in DS 12.2.6. Plot the residuals against the temperature. Are there any points that are possible outliers? Does the residual plot have any patterns that suggest that the fitted regression model is not appropriate?

12.8.2

Make a plot of the data set given in DS 12.8.2. What intrinsically linear function should provide a good model for this data set? What transformation of the variables is needed? Fit a straight line to the transformed variables and write the fitted model back in terms of the original variables. What is the predicted value of the dependent variable y when $x = 2.0$?

12.8.4 Synthetic Human Arteries

In an experiment to investigate the suitability of using a silicone tube to model the behavior of a human artery, the data set in DS 12.8.4 is collected, which relates the pressure differential P across the walls of the tube to the cross-sectional area A of the tube.

(a) Show that the model

$$P = \gamma_0 A^{\gamma_1}$$

appears to provide a good fit to the data set.

(b) Make a suitable transformation of the variables and find point estimates for γ_0 and γ_1.

(c) Calculate two-sided 95% confidence intervals for γ_0 and γ_1.

12.8.6 Explain how simple linear regression can be used to fit the model $e^{y/\gamma_0} = \gamma_1/x^2$. How would you find the parameter estimates $\hat{\gamma}_0$ and $\hat{\gamma}_1$?

12.9.4 **Truck Unloading Times**

The data set of the times taken to unload a truck at a warehouse given in DS 12.2.2. For the data sets in DS 12.2.2, what is the sample correlation coefficient r? Show that the t-statistic written in terms of the sample correlation coefficient $t = r\sqrt{n-2}/\sqrt{1-r^2}$ is equal to the t-statistic $t = \hat{\beta}_1/s.e.(\hat{\beta}_1)$ calculated earlier.

12.12.19 **Static Breaking Strengths of Ropes**

DS 12.11.16 contains the static breaking strengths of ropes of different diameters. This tensile strength is the maximum load that a rope can sustain before breaking. What model would you recommend for the relationship between breaking strength and rope diameter?