

Show **all** of your work on this assignment and answer each question fully in the given context.

Please staple your assignment!

1. Chapter 4, Section 1, Exercise 3 (unless directed otherwise you may use JMP; include plots as requested) (page 161) [5 pts each, 25 pts total]
2. Chapter 4, Section 1, Exercise 4 (unless directed otherwise you may use JMP; include plots as requested) (page 161) [5 pts each, 15 pts total]
3. Chapter 4, Section 2, Exercise 1 (unless directed otherwise you may use JMP; include plots as requested) (page 161) [10 pts]
4. Chapter 4, Section 2, Exercise 2 (unless directed otherwise you may use JMP; include plots as requested; skip part h) (page 161) [5 pts each, 35 pts total]
5. The major cause of axel failure in freight trucks is when shippers exceed the recommended weight limits that can be handled by the axels. Issues resulting from these failures have been becoming more frequent as shippers try to cut corners, leading members of the state's Department of Transportation to ask one of their civil engineers to look into the available data and better advise them on the relationship between excessive weight and axel failure.

A company manufacturing axels provides the engineer with data gathered from conducting experiments loading axels with excessive weight and simulating traveling conditions. The data consists of two columns, **excessive weight (in tonnes)** is the amount of weight over the limit that was placed on the axel, and **distance to failure (in tens of thousands of miles)** is the simulated distance to the axel's failure.

Here are some summaries of the data:

$$\begin{aligned}\sum_{i=1}^{50} x_i &= 64 & \sum_{i=1}^{50} x_i^2 &= 107 \\ \sum_{i=1}^{50} y_i &= 2039 & \sum_{i=1}^{50} y_i^2 &= 98563 \\ \sum_{i=1}^{50} x_i y_i &= 2016\end{aligned}$$

- (a) Using the summaries above, fit a linear relationship between **weight exceeding guidelines** (x) and **travel distance to failure** (y). [10 pts]
- (b) Write the equation of the fitted linear relationship. [5 pts]

- (c) Find and interpret the value of  $R^2$  for the fitted linear relationship.[5 pts]
- (d) Using the fitted line, provide a predicted value of travel distance to failure when the weight exceeding the guidelines is 3.4 tonnes.[5 pts]

Total: 100 pts