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

Please staple your assignment!

1. Chapter 4, Exercise 12, page 208 (unless directed otherwise you may use JMP; include plots as requested) [5 pts each part, 20 pts total]

2. Chapter 4, Exercise 16 (unless directed otherwise you may use JMP; include plots as requested; parts (a) - (g) only) (page 211)[5 pts each, 35 pts total]

3. This is the rest of the problem 5 in HW 4.
   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:

$$\sum_{i=1}^{50} x_i = 64 \qquad \sum_{i=1}^{50} x_i^2 = 107$$

$$\sum_{i=1}^{50} y_i = 1645 \qquad \sum_{i=1}^{50} y_i^2 = 66601$$

$$\sum_{i=1}^{50} x_i y_i = 1556$$

   (a) The JMP output below comes from fitting a quadratic model using x and x^2.

Response Distance to Failure

Summary of Fit

RSquare	REDACTED
RSquare Adj	REDACTED
Root Mean Square Error	5.281589
Mean of Response	0.16
Observations (or Sum Wgts)	50

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	2	13229.647	6614.82	237.1314
Error	47	1311.073	27.90	Prob > F
C. Total	49	14540.720		<.0001*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|
Intercept	16.27602	2.333507	6.97	<.0001*
Weight Exceeding Limit	4.6604349	4.221593	1.10	0.2752
(Weight Exceeding Limit)^2	-10.2775	1.604983	-6.40	<.0001*

(b) Write the equation of the fitted quadratic relationship. [5 pts]

(c) Find and interpret the value of R^2 for the fitted quadratic relationship.[5 pts]

(d) Using the fitted quadratic relationship, provide a predicted value of travel distance to failure when the weight exceeding the guidelines is 3.4 tonnes.[5 pts]

Total: 70 pts