

**MTH 133
REGRESSION
IN-CLASS PROJECT**

You have been given a set of automobile data. This data set contains around 400 different makes of 2004 cars, their city and highway mpg ratings, their weights, wheel base measurements, length and width. You are thinking of buying a new car and would like to analyze this data set to determine some information before you go shopping.

You are to do the following:

1. Find the mean and standard deviation for highway and city MPG for all cars.

	<i>City MPG</i>	<i>Highway MPG</i>	<i>Weight</i>
Mean			
Standard Deviation			

2. Find the 5 number summary and paste in boxplots for highway and city MPG for all cars.

	City MPG	Hwy MPG	Weight
Range			
Minimum			
Q1			
Median			
Q3			
Maximum			
IQR			
Lower Fence			
Upper Fence			

3. Do the boxplots tell us that there are outliers? If so, which cars are they? What could be possible reasons for their being outliers?

4. Find a car similar to any of your cars in the list. How far does your car deviate from the mean in terms of city and highway mpg? What do you think about this result?

5. Now, let's find out what contributes to the city and highway mpg ratings. Do regression analysis on weight vs. city mpg and weight vs. highway mpg. Fill in the following table:

	City MPG	Hwy MPG
r		
r^2		
a		
b		
Model ($y=ax+b$)		

What do you notice about the models? What can be said about them?

6. What does r tell us about how weight and mpg correlate for city and hwy mpg?

7. What does r^2 tell us about our model in both of these cases?

8. Look at the plot of the residuals for each case (city and hwy). What does this tell us? Is a linear model appropriate here? Why or why not? Are there outliers?

9. Find the five number summaries for the residuals for each case and determine the fences. Draw boxplots for the residuals. Which values are outliers? Are they the same as the outliers you found from number 3?

	City MPG	Hwy MPG
Min		
Q1		
Median		
Q3		
Max		
	City MPG	Hwy MPG
IQR		
Lower Fence		
Upper Fence		

10. You have decided to buy one of the following cars but the makers have not issued the mpg ratings for them yet and you would like to know what kind of mileage they might get given their available weights. Using your models from 5, fill in the rest of this table.

Make	Weight	City MPG	Highway MPG
2008 Ford F-250	6458		
2008 Chevrolet Impala	3,637		
2008 Nissan Altima	3,093		
2008 Mazda Tribute	3,464		
2008 BMW M5	4,012		