# MPG Regression

* Running the correlation analysis on dataset shows that vehicle length provides a non-random amount of variance to the mpg values amongst others. The ground clearance has the second rank.
* Running multiple linear regression with mpg as dependent variable and the rest as independent variables comes to reject the null hypothesis (P-value: 5.35e-11 < confidence interval:0.05). Thus, the slop of the linear model is not equal to zero.
* The most effective metrics on mpg are vehicle length and ground clearance with p-values less than 0.05.
* It may be more effective to remove the non-significant variables from the linear regression model. This reduces the overall p-value of the model from 5.35e-11 to 3.637e-12.

# Suspension Coil Summary

* Using the same MechaCarWriteUp.txt text file, provide a short write-up of your interpretation and findings for the suspension coil summary statistics. Be sure to include the following details:
* The data are summarized for each lot. Mean, median, and mode are all equal in the case of Lot 1 and 2 which suggests a zero skewness for the collected data in Lot 1 and Lot 2. However, Lot 3 where median greater than mean has a left skewed distribution.
* The design specifications for the MechaCar suspension coils dictate that the variance of the suspension coils must not exceed 100 pounds per inch. Per our results, Lot 3 does not satisfy the specifications with a variance of 170 for suspension oil.

# Suspension Coil t-Test

* Null hypothesis: The suspension coil’s pound-per-inch results are statistically different from the mean population results of 1,500 pounds per inch
* Alternative hypothesis: The suspension coil’s pound-per-inch results are statistically different from the mean population results of 1,500 pounds per inch
* Running a two sided t-Test on the results suggests that we fail to reject the null hypothesis (p-value:0.06028>0.05). Thus the sample suspension coil’s pound-per-inch results are not statistically different from 1,500.
* A confidence interval of 95 percent was used in this analysis, and the confidence limit is to be from 1497.507 to 1500.053. The sample we tested with a mean of 1498.78 exists withing the confidence limit, thus we fail to reject the null hypothesis.

# Design your own Car

| **Metric** | **Independent**  **variable** | **Dependent**  **variable** | **Question to ask** | **H0** | **Ha** | **Statistical Test** |
| --- | --- | --- | --- | --- | --- | --- |
| Price | MSRP of MechaCar  vs  MSRP of similar car from other companies in US | MSPR | Is there a statistical difference between the distribution means from two samples? | MechCar’s MSPR is greater than MSRP of similar car from other companies in US. | MechCar’s MSPR is less than or equal to MSRP of similar car from other companies in US. | Two-Sample t-Test |
| Fuel Efficiency | MPG of MechaCar  vs  MPG of similar car from other companies in US | MSPR | Is there a statistical difference between the distribution means from two samples? | MechCar’s MPG is greater than MPG of similar car from other companies in US. | MechCar’s MPG is less than or equal to MPG of similar car from other companies in US. | Two-Sample t-Test |
| Color Option | Number of color options | Sales profit in a year | Is there a correlation between number of color options and sales profit in a year? | There is no correlation between number of color options and sales profit in a year. | There is a correlation between number of color options and sales profit in a year. | Simple Linear Regression |
| More than 2 color options vs less than 2 color options | Best-selling car or not-best selling car | Is there a relationship between color options and sale? | There is no relationship between color options and sale. | There is a relationship between color options and sale. | Chi-Squared Test |
| Laboratory Safety Score | Car make | Laboratory safety score | Is there a statistical difference between the distribution of means from different car makes? | There is no statistical difference between car make and laboratory safety score. | There is a statistical difference between car make and laboratory safety score. | ANOVA |