

# Homework 1

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## Introduction

This document provides a plot based on a dataset from an R package.

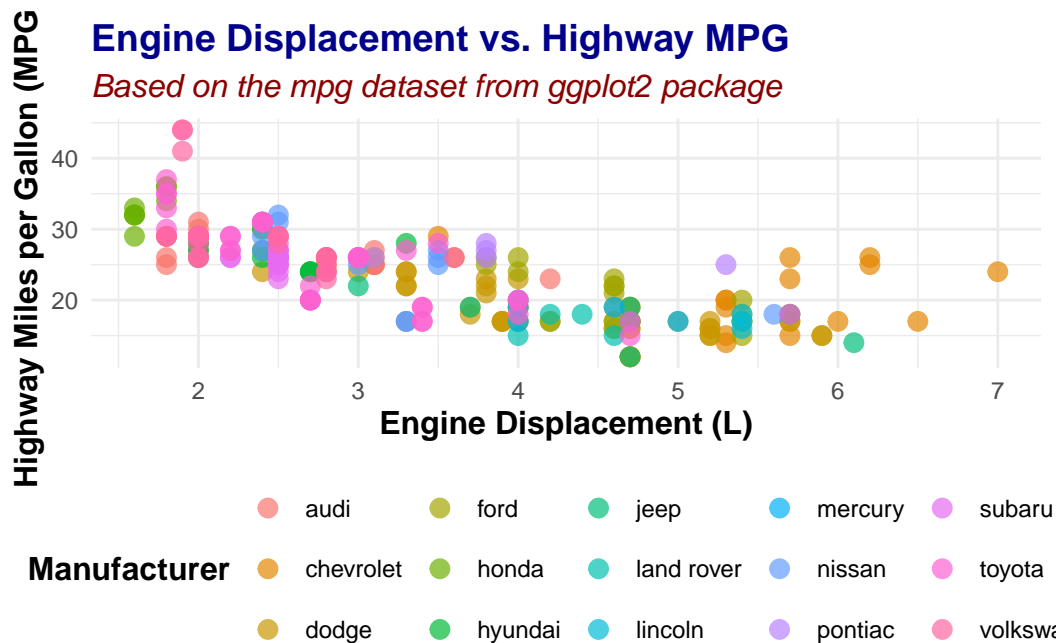
## Dataset

The dataset used in this plot is the `ggplot2` package's `mpg` dataset. The `mpg` dataset contains observations collected by the *US Environmental Protection Agency* on 38 models of cars.

It includes variables such as *manufacturer*, *model*, *engine displacement*, *year*, *number of cylinders*, *transmission*, *drive type*, and *fuel economy (in city and highway driving)*.

## Plot

Below is a scatter plot showing the relationship between engine displacement (in liters) and highway miles per gallon. I've added colors for each manufacturer and labels to make it visually appealing.



## Description of the Plot

### Overall Trend

- **Negative correlation:** Overall, highway MPG shows a decreasing trend with increasing engine displacement. This indicates that larger engines are generally less efficient and require more fuel.

### Anylasis of Manufactures

- **Manufacturer differences:** Different manufacturers have different MPG on the highway for the same engine displacement. For example, Toyota and Honda models exhibit higher MPG for smaller displacements (2-3 liters).
- **Group Distribution:**
  - *Toyota and Honda:* Mainly concentrated in the 2 to 3 liter displacement range, with higher MPG.
  - *Ford and Chevrolet:* Covers a wide range of displacements, from less than 2 liters to close to 7 liters, with a wide MPG range.
  - *Volkswagen:* Mainly concentrated in the displacement range of less than 3 liters, MPG performance is also relatively high.

### Conclusion

- According to the data, if consumers are concerned about fuel economy, they should consider choosing a model with a smaller displacement (2-3 liters) from Toyota or Honda.