**Case Study – Exploratory Data Analysis**

The goal of this assignment is to analyze the Fuel Economy Dataset to understand vehicle characteristics, efficiency, and performance trends using summary statistics and visualization techniques.

Submit a report (PDF or Word) that includes:

* Answers to the questions below with relevant visualizations.
* R/Python Code used for analysis (in Appendix section after all questions answered).

Dataset Description**:**

The dataset includes fuel efficiency data for various cars. Each row represents a specific vehicle, with features describing its performance and physical characteristics. This dataset includes columns:

* mpg: Miles per gallon (fuel efficiency).
* cylinders: Number of cylinders in the engine.
* displacement: Engine displacement (cubic inches).
* horsepower: Engine horsepower.
* weight: Vehicle weight (lbs).
* acceleration: Time to accelerate from 0 to 60 mph (seconds).
* model\_year: Year the vehicle model was manufactured.
* origin: Origin of the car (USA, Europe, Japan).

If you are using R, you can import data using code: data <- read.csv("file path/mpg.csv").

Questions:

Part 1: Summary Statistics (10pts)

1. Overall Analysis:
   1. Calculate the mean, median, and standard deviation for mpg, horsepower, and weight.
2. Grouped Analysis:
   1. Group the data by origin and calculate the average mpg, horsepower, and weight for each region.
   2. Which region has the most fuel-efficient cars on average?

Part 2: Data Visualization (15pts)

1. Univariate Analysis:
   1. Create a histogram of mpg. What is the most common range of fuel efficiency?
   2. Create a boxplot of weight grouped by cylinders. What trends do you observe in vehicle weight based on the number of cylinders?
2. Bivariate Analysis:
   1. Create a scatterplot of horsepower vs mpg. Does higher horsepower generally relate to lower fuel efficiency?
   2. Create a scatterplot of weight vs mpg. Discuss the relationship between vehicle weight and fuel efficiency.
3. Trend Analysis:
   1. According to line plot of the average mpg over model year. How has fuel efficiency changed over time?

A graph with purple line and numbers

Description automatically generated