

In [10]: *# Question 1*

```
import pandas as pd
import matplotlib.pyplot as plt

df = pd.read_csv("cars.csv")

data = df[['mpg', 'cyl', 'disp', 'hp', 'wt']].dropna()

plt.figure(figsize=(10, 7))

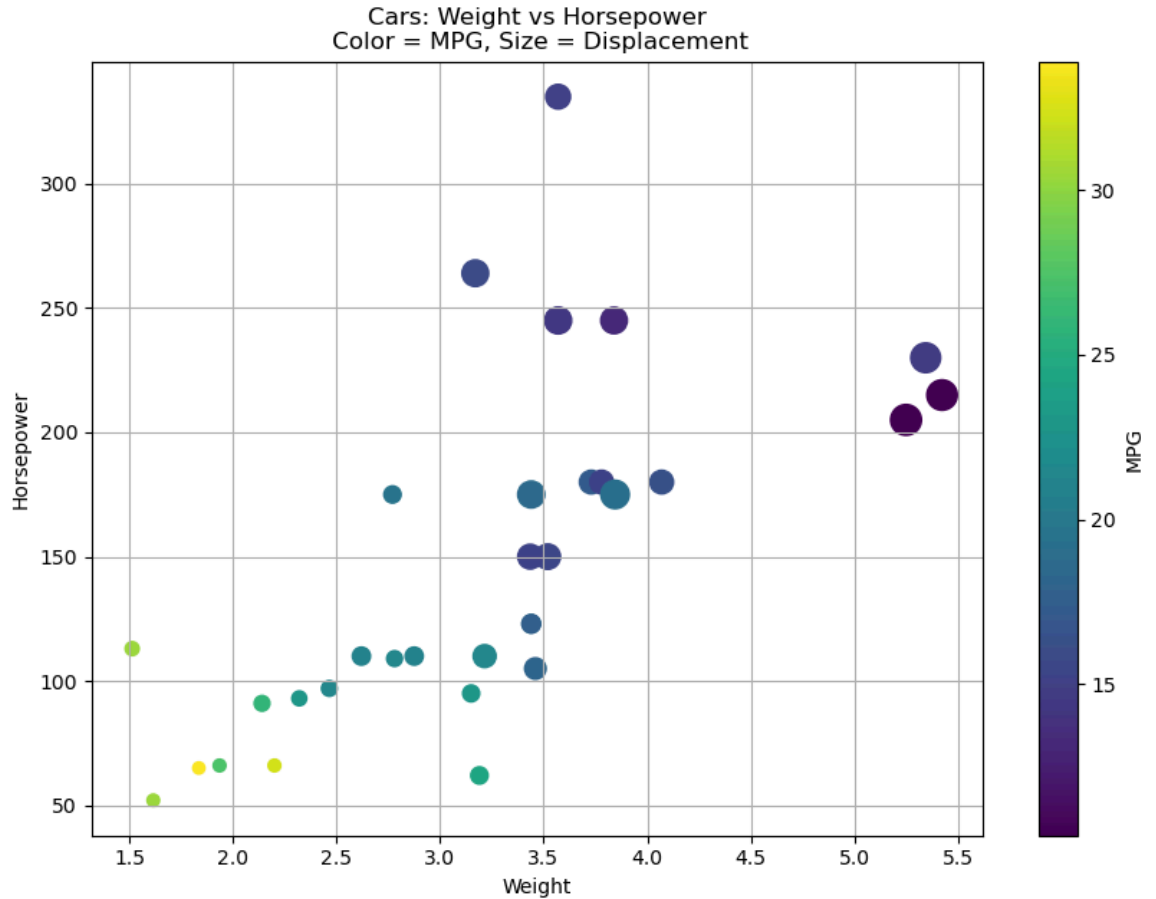
plt.scatter(
    data['wt'],
    data['hp'],
    s=data['disp'] * 0.5,
    c=data['mpg'],
)

plt.xlabel("Weight")
plt.ylabel("Horsepower")

plt.title("Cars: Weight vs Horsepower\n Color = MPG, Size = Displacement")

cbar = plt.colorbar()
cbar.set_label("MPG")

plt.grid()
plt.show()
```



In [12]: *# Question 1 (AI Solution)*

```
import pandas as pd
import matplotlib.pyplot as plt

# Load dataset
df = pd.read_csv("cars.csv")

# Create figure
fig, ax = plt.subplots(figsize=(10, 7))

# Normalize horsepower for bubble sizes
size_scale = 20
sizes = (df["hp"] / df["hp"].max()) * size_scale**2

# Scatter plot
sc = ax.scatter(
    x=df["wt"], y=df["mpg"],
    s=sizes,
    c=df["cyl"],
    cmap="plasma",
    alpha=0.8,
    edgecolor="white",
    linewidth=0.7
)

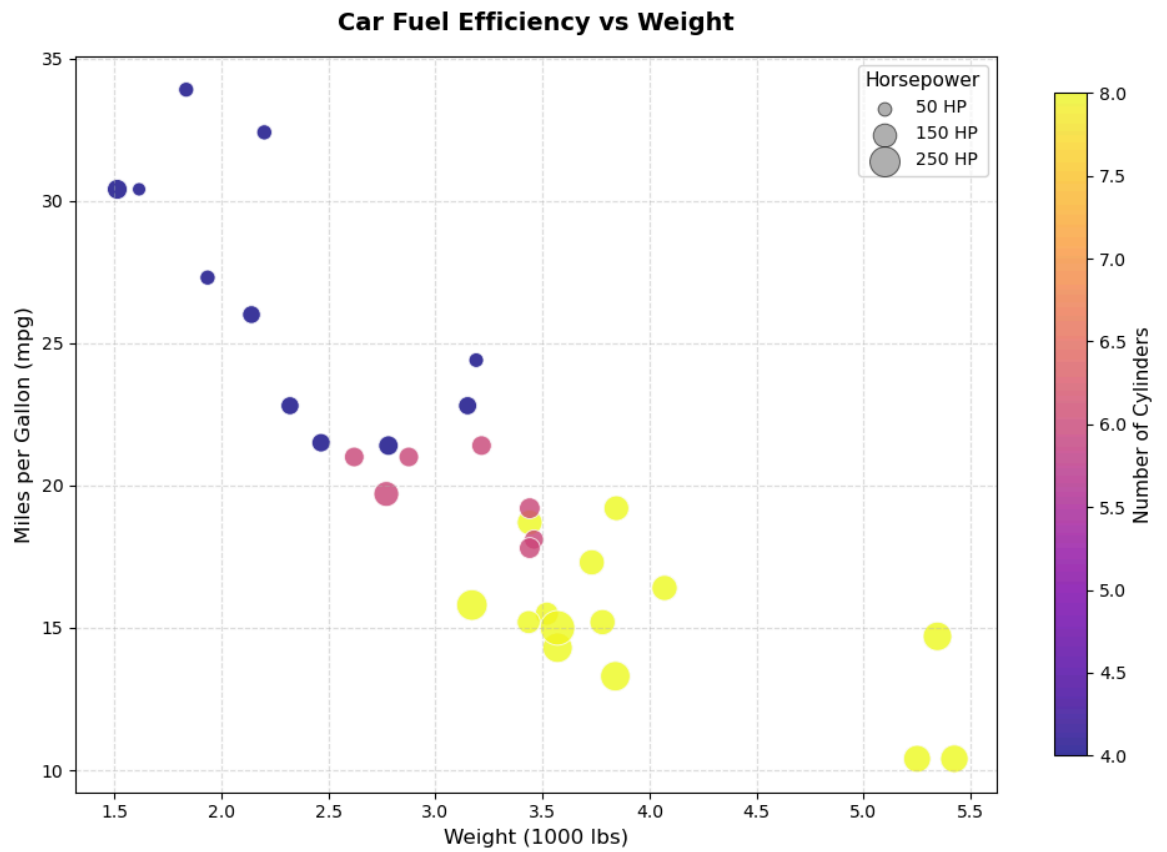
# Titles and labels
ax.set_title("Car Fuel Efficiency vs Weight", fontsize=14, fontweight="bold")
ax.set_xlabel("Weight (1000 lbs)", fontsize=12)
ax.set_ylabel("Miles per Gallon (mpg)", fontsize=12)
ax.grid(True, linestyle="--", alpha=0.4)

# Colorbar for cylinders
cbar = plt.colorbar(sc, ax=ax, shrink=0.9, aspect=20)
cbar.set_label("Number of Cylinders", fontsize=11)

# Custom legend for horsepower bubbles
for hp in [50, 150, 250]:
    plt.scatter([], [],
                s=(hp / df["hp"].max()) * size_scale**2,
                c="gray", alpha=0.6,
                edgecolor="k", linewidth=0.7,
                label=f"{hp} HP")

legend = ax.legend(title="Horsepower", frameon=True, fontsize=10, loc="upper right")
plt.setp(legend.get_title(), fontsize=11)

plt.tight_layout()
plt.show()
```



## AI tool used: Chatgpt

''' Prompt: Write a Python code using matplotlib that shows the relationships among the following variables for all cars in the dataset: Fuel efficiency ("mpg" column), Number of cylinders, Displacement (cu.in.), Gross horsepower, and Weight. '''

In [1]: # Question 2

```
import numpy as np
import matplotlib.pyplot as plt

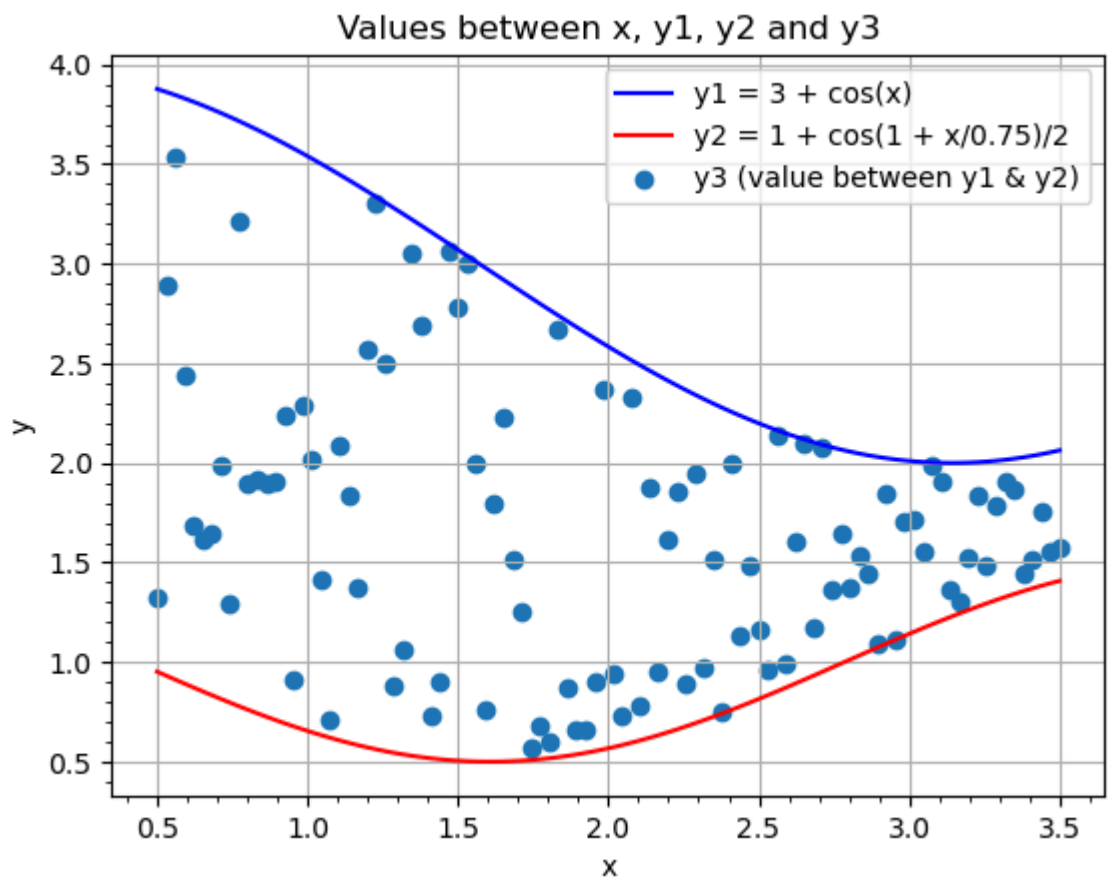
x = np.linspace(0.5, 3.5, 100)

y1 = 3 + np.cos(x)
y2 = 1 + np.cos(1 + x/0.75) / 2
y3 = np.random.uniform(y1, y2, len(x))

plt.plot(x, y1, label="y1 = 3 + cos(x)", color="blue")
plt.plot(x, y2, label="y2 = 1 + cos(1 + x/0.75)/2", color="red")
plt.scatter(x, y3, label="y3 (value between y1 & y2)")

plt.xlabel("x")
plt.ylabel("y")

plt.title("Values between x, y1, y2 and y3")
plt.legend()
plt.grid()
plt.minorticks_on()
plt.show()
```



In [2]: # Question 2 (AI Solution)

```
import numpy as np
import matplotlib.pyplot as plt

# Define x
x = np.linspace(0.5, 3.5, 100)

# Define curves
y1 = 3 + np.cos(x)
y2 = 1 + np.cos(1 + x/0.75) / 2

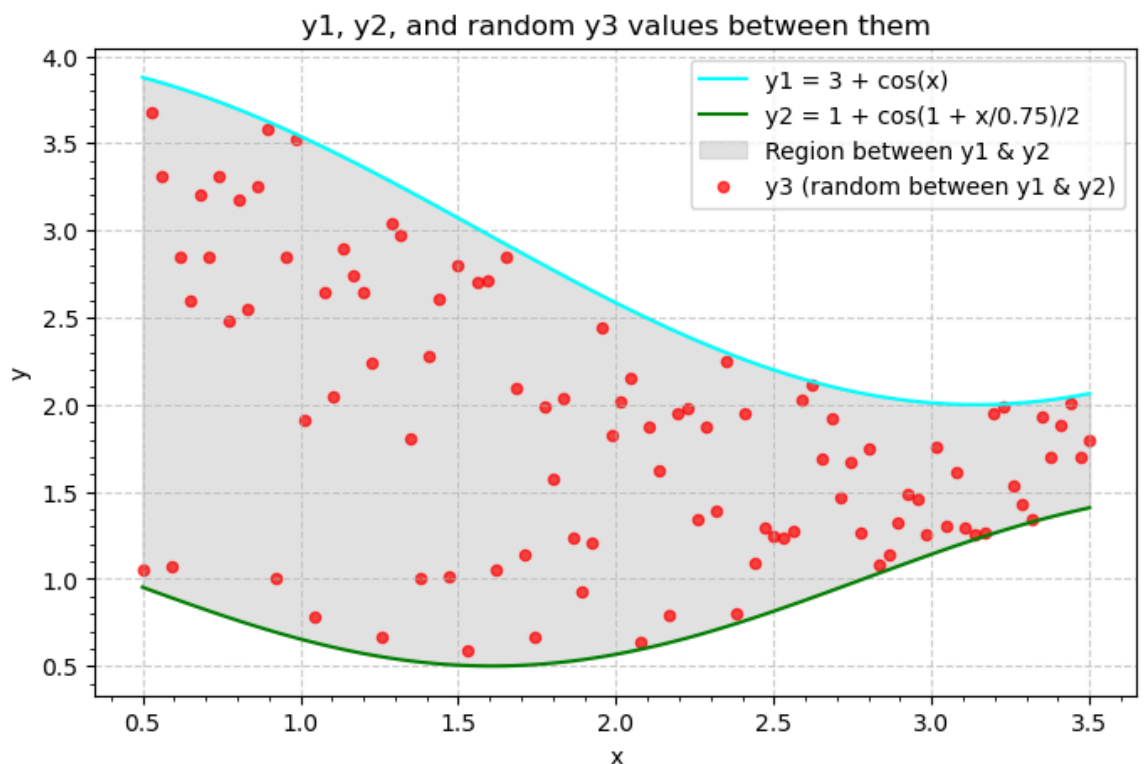
# Random points between y1 and y2
y3 = np.random.uniform(y1, y2, len(x))

# Plot
plt.figure(figsize=(8, 5))
plt.plot(x, y1, label="y1 = 3 + cos(x)", color="cyan")
plt.plot(x, y2, label="y2 = 1 + cos(1 + x/0.75)/2", color="green")

# Shade area between y1 and y2
plt.fill_between(x, y1, y2, color="gray", alpha=0.2, label="Region bet

# Random points inside shaded area
plt.scatter(x, y3, label="y3 (random between y1 & y2)", color="red", s

plt.xlabel("x")
plt.ylabel("y")
plt.title("y1, y2, and random y3 values between them")
plt.legend()
plt.grid(True, linestyle="--", alpha=0.6)
plt.minorticks_on()
plt.show()
```



## AI tool used: Chatgpt

''' Prompt: Write a Python code using matplotlib for

```
x = np.linspace(0.5, 3.5, 100);
```

```
y1 = 3+np.cos(x); y2 = 1+np.cos(1+x/0.75)/2; y3 = np.random.uniform(y1, y2, len(x))
```

```
'''
```

## Question 3

[https://public.tableau.com/app/profile/ameya.khond4240/viz/Assignment1Q3\\_175746148908/publish=yes](https://public.tableau.com/app/profile/ameya.khond4240/viz/Assignment1Q3_175746148908/publish=yes)  
([https://public.tableau.com/app/profile/ameya.khond4240/viz/Assignment1Q3\\_175746148908/publish=yes](https://public.tableau.com/app/profile/ameya.khond4240/viz/Assignment1Q3_175746148908/publish=yes))

## Question 4

[https://public.tableau.com/app/profile/ameya.khond4240/viz/Book1\\_17569492614960/Dashb/publish=yes](https://public.tableau.com/app/profile/ameya.khond4240/viz/Book1_17569492614960/Dashb/publish=yes)  
([https://public.tableau.com/app/profile/ameya.khond4240/viz/Book1\\_17569492614960/Dashb/publish=yes](https://public.tableau.com/app/profile/ameya.khond4240/viz/Book1_17569492614960/Dashb/publish=yes))

Dataset used: FIFA World Cup Results from Tableau public sample data

In [ ]: