**Lab 1: Linear Regression without libraries.**

# Step 1: Sample data

# x -> feature, y -> target

x = [1, 2, 3, 4, 5]

y = [3, 4, 2, 5, 6]

# Step 2: Calculate means of x and y

x\_mean = sum(x) / len(x)

y\_mean = sum(y) / len(y)

# Step 3: Calculate the slope (theta\_1)

numerator = sum((xi - x\_mean) \* (yi - y\_mean) for xi, yi in zip(x, y))

denominator = sum((xi - x\_mean) \*\* 2 for xi in x)

theta\_1 = numerator / denominator

# Step 4: Calculate the intercept (theta\_0)

theta\_0 = y\_mean - theta\_1 \* x\_mean

print(f"Slope (theta\_1): {theta\_1}")

print(f"Intercept (theta\_0): {theta\_0}")

# Step 5: Define the prediction function

def predict(x\_values):

return [theta\_0 + theta\_1 \* xi for xi in x\_values]

# Step 6: Test the model

x\_test = [6, 7, 8]

y\_pred = predict(x\_test)

print(f"Predictions for {x\_test}: {y\_pred}")

# Step 7: Visualize the results

import matplotlib.pyplot as plt

# Plot original data

plt.scatter(x, y, color='blue', label='Original Data')

# Plot regression line

x\_line = range(min(x), max(x) + 1)

y\_line = predict(x\_line)

plt.plot(x\_line, y\_line, color='red', label='Regression Line')

plt.xlabel('x')

plt.ylabel('y')

plt.legend()

plt.show()