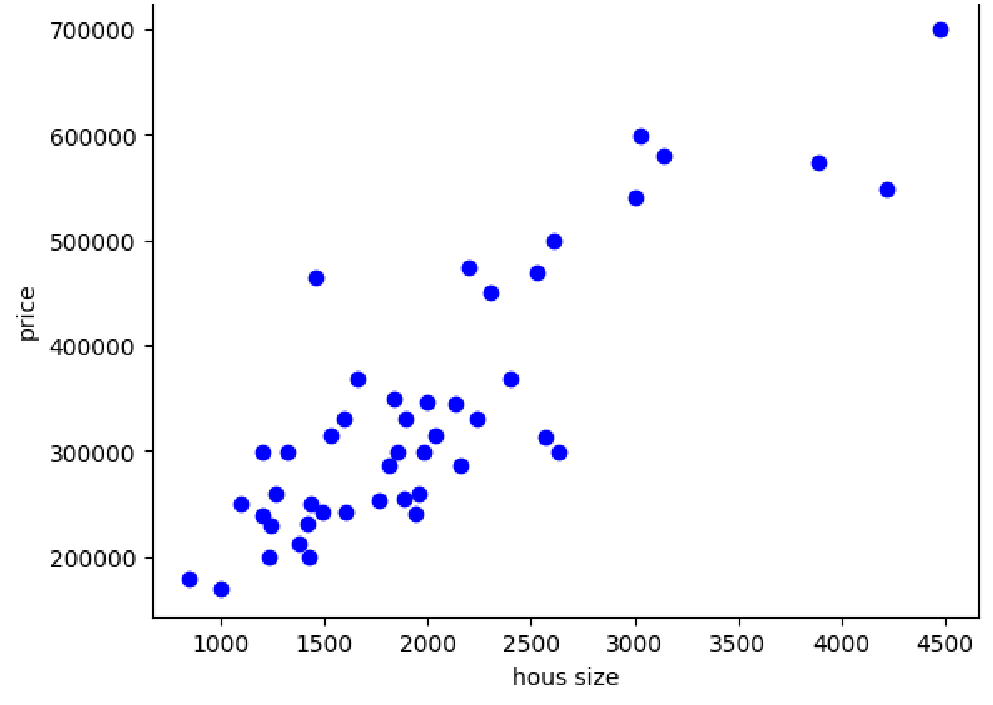
PRAKTIKUM 4 AHMAD YAHYA G.211.21.0097

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

mu = []
std = []

def load_data(filename):
    df = pd.read_csv(filename, sep=",", index_col=False)
    df.columns = ["houssize", "rooms", "price"]
    data = np.array(df, dtype=float)
    plot_data(data[:,:2], data[:, -1])
    normalize(data)
    return data[:,:2], data[:, -1]

def plot_data(x, y):
    plt.xlabel('hous size')
    plt.ylabel('price')
    plt.plot(x[:,0], y, 'bo')
    plt.show()

def normalize(data):
    for i in range(0,data.shape[1]-1):
        data[:,1] = ((data[:,i] - np.mean(data[:,i]))/np.std(data[:, i]))
        mu.append(np.mean(data[:,i]))
        std.append(np.std(data[:, i]))

def h(X,theta):
    return np.matmul(X, theta)

def cost_function(x, y, theta):
    return ((h(x, theta)-y).T@(h(x, theta)-y))/(2*y.shape[0])

def gradient_descent(x, y, theta, learning_rate=0.1, num_epochs=10):
    m = x.shape[0]
    J_all = []

    for _ in range(num_epochs):
        h_x = h(x, theta)
        cost_ = (1/m)*(x.T@(h_x - y))
        theta = theta - (learning_rate)*cost_
        J_all.append(cost_function(x, y, theta))

    return theta, J_all

def plot_cost(J_all, num_epochs):
    plt.xlabel('Epochs')
    plt.ylabel('Cost')
    plt.plot(num_epochs, J_all, 'm', linewidth = "5")
    plt.show()

def test(theta, x):
    x[0] = (x[0] - mu[0])/std[0]
    x[1] = (x[1] - mu[1])/std[1]

    y = theta[0] + theta[1]*x[0] + theta[2]*x[1]
    print("Prce of house: ", y)

x,y = load_data("house_price_data.txt")
y = np.reshape(y, (46,1))
x = np.hstack((np.ones((x.shape[0],1)), x))
theta = np.zeros((x.shape[1], 1))
```

```
learning_rate = 0.1
num_epochs = 50
theta, J_all = gradient_descent(x, y, theta, learning_rate, num_epochs)
J = cost_function(x, y, theta)
print("Cost: ", J)
print("Parameters: ", theta)

n_epochs = []
jplot = []
count = 0
for i in J_all:
    jplot.append(i[0][0])
    n_epochs.append(count)
    count += 1

jplot = np.array(jplot)
n_epochs = np.array(n_epochs)
plot_cost(jplot, n_epochs)

test(theta, [1600, 3])
```



```
Cost:  [[inf]]
Parameters:  [[-1.28387416e+282]
 [-2.97132052e+285]
 [-5.10452620e+281]]
<ipython-input-1-7718af13dcc1>:32: RuntimeWarning: overflow encountered in matmul
  return ((h(x, theta)-y).T@(h(x, theta)-y))/(2*y.shape[0])
```