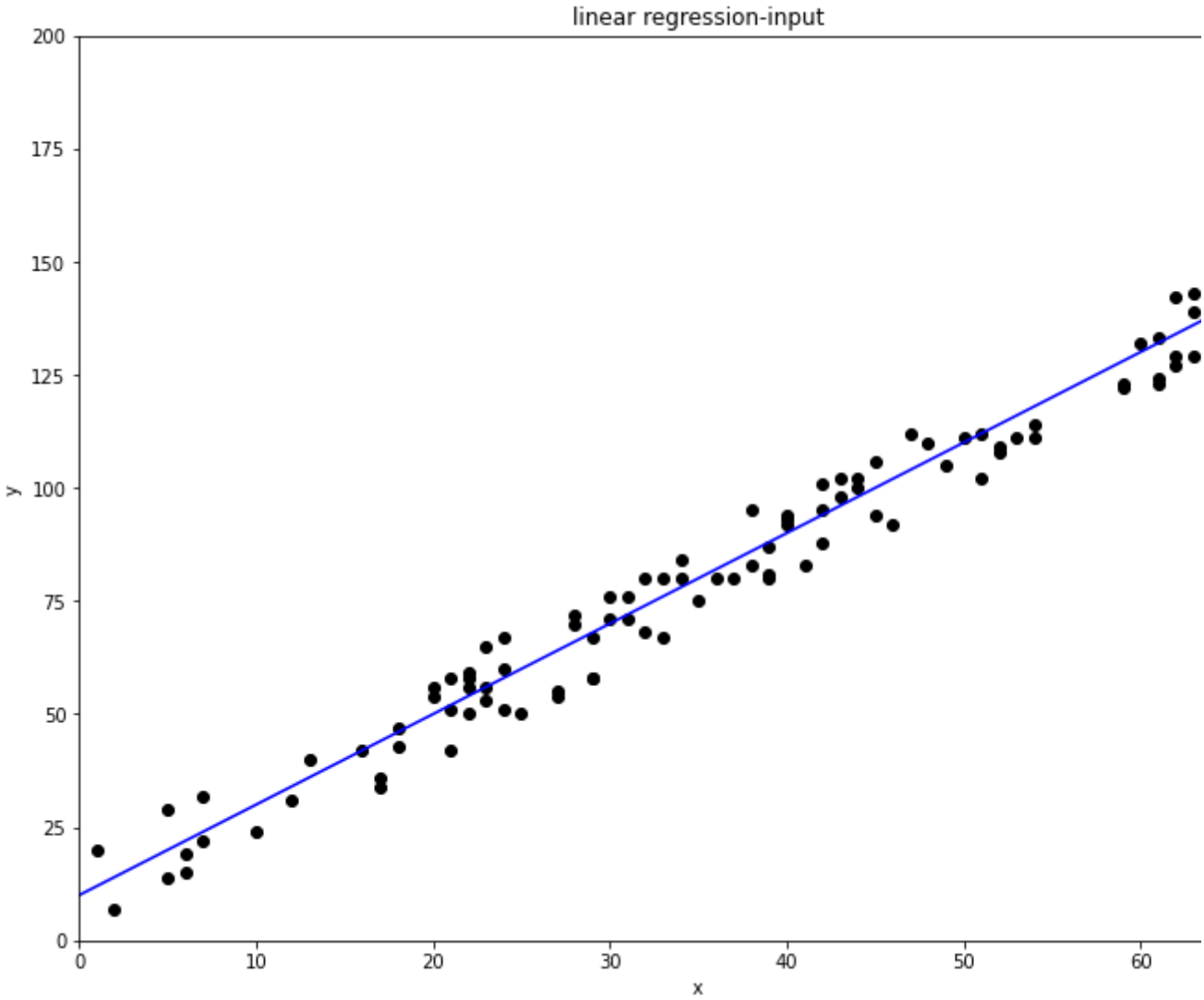
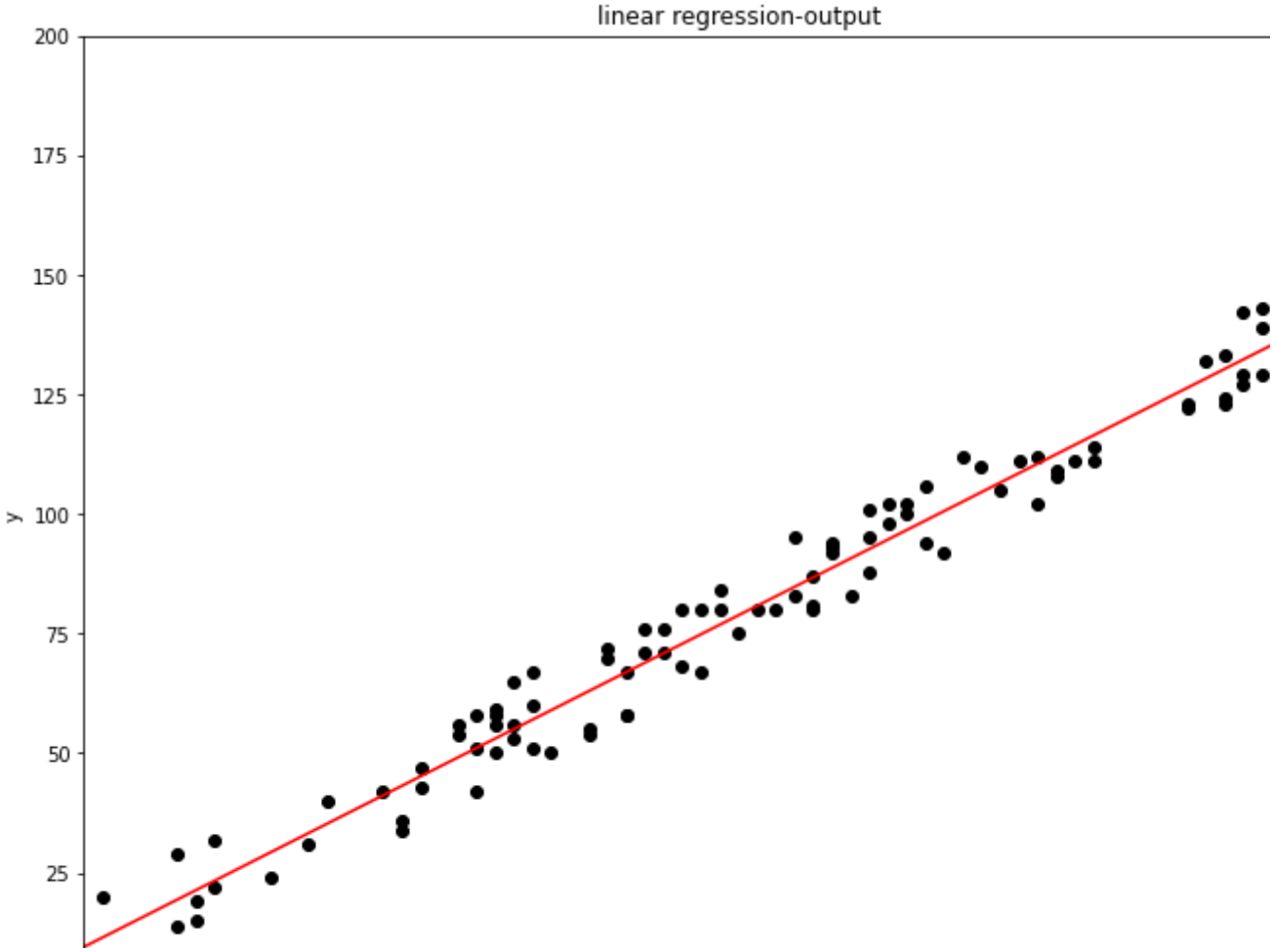
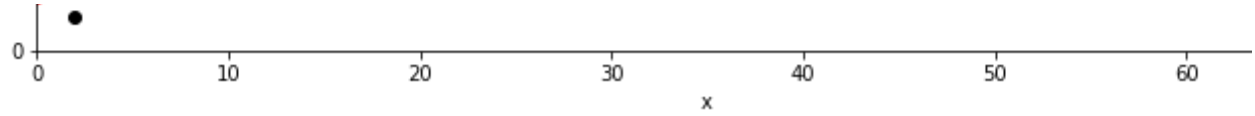
```
import numpy as np
from matplotlib import pyplot as plt
import random


def compute_cost(theta, x, y):
  m=float(len(y))
  prediction=theta[0]+theta[1]*x
  J=(1/2)*(1/m)*(np.sum(np.square(prediction-y)))
  return J




#input
#y=ax+b => y=2x+5
data_len=100
data_x=np.zeros(data_len)
data_y=np.zeros(data_len)
i = 0

while i < len(data):

  data_x[i]=random.randrange(1,70)
  data_y[i]=2*data_x[i]+random.randrange(-10,10)+10
  i+=1;


a = range(0, 70)
b = [2*v+10 for v in a]
plt.plot(a, b, c='blue')
plt.scatter(data_x, data_y,c='black')
plt.xlabel('x')
plt.ylabel('y')
plt.title('linear regression-input')
plt.axis([0, 70, 0, 200])
plt.show()


#y = Theta0 + Theta1 * x
#initial Theta0 = 9, Theta1 = 0
theta=[9,0]
alpha=0.001
num=3000

n = float(len(data_x))
J_history=np.zeros(num)
theta_history=np.zeros((num,2))



for i in range(num):
    prediction=theta[1]*data_x+theta[0]
    loss=prediction - data_y
```

```
        loss prediction = data_y
        t0 = alpha*(1/n)*np.sum(loss)
        t1 = alpha*(1/n)*np.sum(loss*data_x)


        theta[0]-=t0
        theta[1]-=t1

        J_history[i]=compute_cost(theta,data_x,data_y)
        theta_history[i,0]=theta[0]
        theta_history[i,1]=theta[1]


    w = range(0, 70)
    q = [theta[1]*v+theta[0] for v in w]
    plt.plot(w, q, c='red')
    plt.scatter(data_x, data_y,c='black')
    plt.xlabel('x')
    plt.ylabel('y')
    plt.title('linear regression-output')
    plt.axis([0, 70, 0, 200])
    plt.show()

    print(compute_cost(theta, data_x, data_y))

    fig = plt.figure()


    ax = fig.add_subplot(111,projection='3d')
    x=theta_history[:,0]
    y=theta_history[:,1]
    z=J_history

    ax.scatter(x,y,z,c='blue')
    ax.scatter(x,0,0,c='red')
    ax.scatter(0,y,0,c='blue')
    print("theta is")
    print(theta)
```


linear regression-input
y
x
0
25
50
75
100
125
150
175
200
0
10
20
30
40
50
60


linear regression-output
y
0
25
50
75
100
125
150
175
200




```
16.97184835756978
theta is
[9.499656301361426, 1.9801205335210499]
```