logistic regression

Problem 1 (cost function)

Suppose $\theta_0 = -6$ and $\theta_1 = 3$. In other words, suppose we are using the following hypothesis function to make predictions:

$$h(x) = \frac{1}{1+e^{-(-6+(3)x)}}$$

Given the following dataset, what is $J(\theta_0 = -6, \quad \theta_1 = 3)$? (In other words, how much cost are we enduring if we are using the above given $h(x)$ to make predictions for the points given in the dataset?)

x	y
0.5	0
1	0
1.5	0
2.5	0
3.5	0
4	1
4.5	0
5	1
5.5	1
6	0
6.5	1
7.5	1
8	1
8.5	1
9	1

Problem 2 (gradient descent)

a) Given the following dataset, find the equation of the s-shaped curve that fits to these points best.

(In other words, assuming your s-shaped curve is:

$$h(x) = \frac{1}{1+e^{-(\theta_0+\theta_1 x)}}$$

find values for θ_0 and θ_1 that makes $h(x)$ the best fit to the given points).

Hint: use gradient descent to find θ values that minimize the cost function for logistic regression. Use $\alpha = 0.05$, zeros for initial θ values, and 1000 iterations for your gradient descent.

x	y
0.5	0
1	0
1.5	0
2.5	0
3.5	0
4	1
4.5	0
5	1
5.5	1
6	0
6.5	1
7.5	1
8	1
8.5	1
9	1

b) Based on the θ values calculated in part a of this problem, predict what is the probability of some new observation $x = 10$ to have $y = 1$?

(In other words, what is $h(x = 10)$ now that you have calculated desirable θ values in part a)