# Logistic Regression Quiz

### Question 1

Suppose that you have trained a logistic regression classifier, and it outputs on a new input $x$ a prediction $h_\theta(x) = 0.6$. That means(check all that apply)

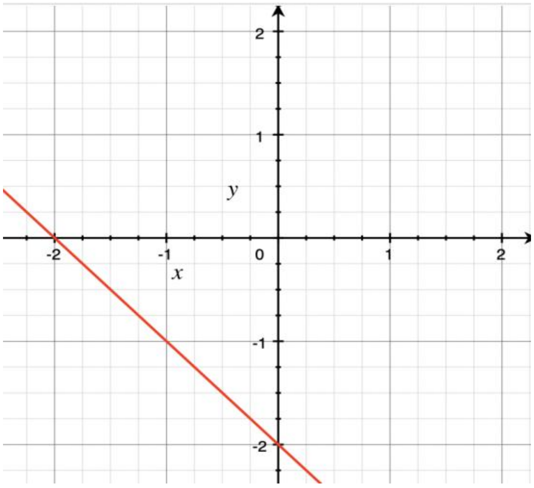
- ☑ $P(y = 1|x;\theta) = 0.6$
- ❑ $P(y = 1|x;\theta) = 0.4$
- ☑ $P(y = 0|x;\theta) = 1 - P(y = 1|x;\theta) = 0.4$
- ❑ $P(y = 0|x;\theta) = P(y = 1|x;\theta) = 0.6$

### Question 2

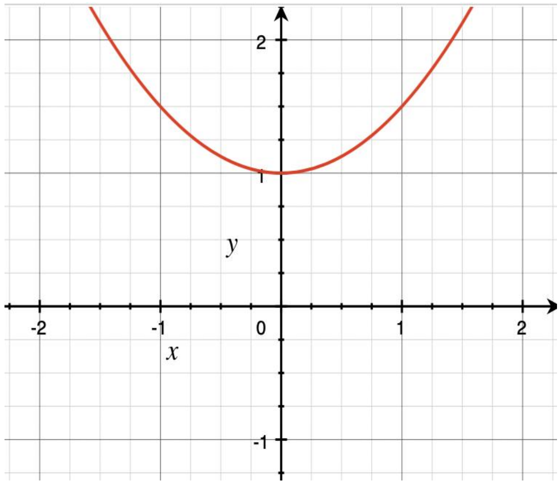
Suppose you train a logistic classifier $h_\theta(x) = \frac{1}{1+e^{-\theta_0-\theta_1 x_1-\theta_2 x_2-\theta_3 x_1^2-\theta_4 x_2^2}}$

Suppose $\theta_4 = 0, \theta_3 = 0, \theta_2 = 1, \theta_1 = 1, \theta_0 = 2$

Which of the following figures represents the decision boundary found by your classifier?




☑

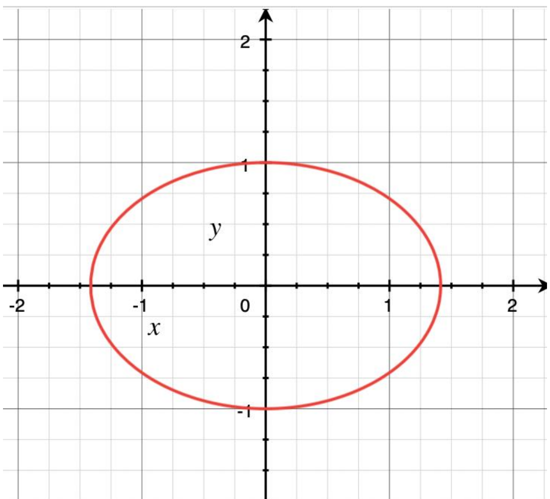



❑

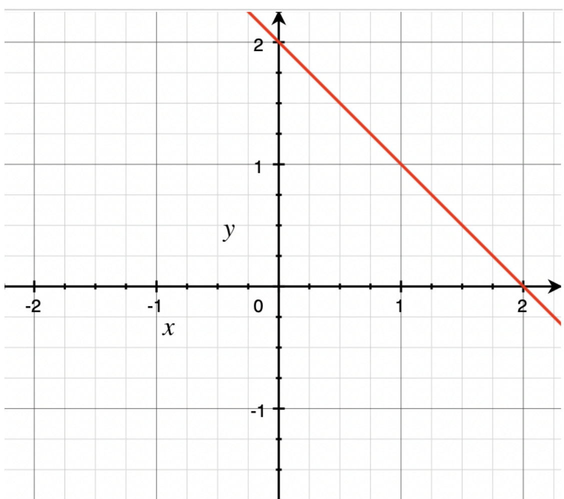
### Question 3

Which of these is a correct Cost function of Logistic Regression? Check all that apply

- ❑ $L(\theta) = \frac{1}{m}\sum_{i=1}^{m}\frac{1}{2}\left|h_\theta\left(x^{(i)}\right) - y^{(i)}\right|^2$
- ☑ $L(\theta) = \frac{1}{m}\sum_{i=1}^{m}\frac{1}{2}\left|h_\theta\left(x^{(i)}\right) - y^{(i)}\right|^2 + \frac{1}{2m}\sum_{j=1}^{m}\theta_j^2$
- ❑ $L(\theta) = \frac{1}{m}\sum_{i=1}^{m} - y^{(i)}\ln h_\theta\left(x^{(i)}\right) - (1 - y^{(i)})\ln\left(1 - h_\theta\left(x^{(i)}\right)\right)$




❑




❑

- [ ] $L(\theta) = \frac{1}{m}\sum_{i=1}^{m} - y^{(i)} \ln h_\theta\left(x^{(i)}\right) - (1 - y^{(i)}) \ln\left(1 - h_\theta\left(x^{(i)}\right)\right) + \frac{1}{2m}\sum_{j=1}^{m} \theta_j^2$

**Question 4**

For logistic regression, the gradient is given by $\frac{\partial L(\theta)}{\partial \theta_j} = \frac{1}{m}\sum_{i=1}^{m}(h_\theta\left(x^{(i)}\right) - y^{(i)})x_0^{(i)} - \frac{1}{m}\lambda\theta_j$

Which of these is a correct gradient descent update for logistic regression with a learning rate of $\alpha$? Check all that apply

- [x] $\theta_j^{(k+1)} = \theta_j^{(k)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_{\theta^{(k)}}\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)} - \frac{1}{m}\lambda\theta_j^{(k)}\right\},\ for\ all\ j = 0,1,2,\ldots$
- [ ] $\theta_0^{(k+1)} = \theta_0^{(k)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_{\theta^{(k)}}\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)}\right\}$
  and $\theta_j^{(k+1)} = \theta_j^{(k)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_{\theta^{(k)}}\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)}\right\},\ for\ all\ j = 1,2,\ldots$
- [ ] $\theta_j^{(k+1)} = \theta_j^{(k)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_{\theta^{(k)}}\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)}\right\},\ for\ all\ j = 0,1,2,\ldots$
- [ ] $\theta_0^{(k+1)} = \theta_j^{(i)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_{\theta^{(k)}}\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)} - \frac{1}{m}\lambda\theta_0^{(k)}\right\}$
  and $\theta_j^{(i+1)} = \theta_j^{(i)} - \alpha\left\{\frac{1}{m}\sum_{i=1}^{m}\left(h_\theta\left(x^{(i)}\right) - y^{(i)}\right)x_0^{(i)} - \frac{1}{m}\lambda\theta_j\right\},\ for\ all\ j = 1,2,\ldots$

**Question 5**

Which of the following statements about regularization are true? Check all that apply.

- [x] Using too large a value of $\lambda$ can cause your hypothesis to underfit the data.
- [ ] Using too small a value of $\lambda$ can cause your hypothesis to overfit the data.
- [ ] Using a very large value of $\lambda$ cannot hurt the performance of your hypothesis; the only reason we do not set $\lambda$ to be too large is to avoid numerical problems.
- [ ] Using too large a value of $\lambda$ can cause your hypothesis to overfit the data; this can be avoided by reducing $\lambda$

---End--