

Logistic Regression*(find and work with a partner)*

1. The output of logistic regression is a model that creates:

- (a) a linear decision boundary
- (b) a logistic decision boundary
- (c) no decision boundary

2. We use logistic regression for:

- (a) classification
- (b) regression
- (c) both

3. Our model in logistic regression is:

$$h_{\mathbf{w}}(\mathbf{x}) = p(y = 1|\mathbf{x}) = \frac{1}{1 + e^{-\mathbf{w} \cdot \mathbf{x}}}$$

If \mathbf{w} is the zero vector (as it would be when starting SGD), what is the probability $y = 1$?

4. Say I train a binary logistic regression model (i.e. outcomes $\in \{0, 1\}$) and end up with $\hat{\mathbf{w}} = [\hat{w}_0, \hat{w}_1]^T = [-4, -5]^T$. What is the decision boundary? Sketch a graph of this logistic model and label the decision boundary. How would you classify a new point $x_{\text{test}} = -2$?

5. The graph below shows the cost for logistic regression as a function of the hypothesis $h_{\mathbf{w}}(\mathbf{x})$, for one example \mathbf{x} . Which curve corresponds to the true label $y = 0$ and which corresponds to $y = 1$?

