CSE 5539-0010 Social Media and Text Analysis
Quiz #3: Logistic Regression

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Due: Beginning of class, Thursday November 7th, 2019

Instructions The goal of this quiz is for you to have a better understanding and memory of some basic concepts about logistic regression. Please show as much of your work as possible! Answers without supporting work may not be given credit.

1 Cost Function

In logistic regression, the cost function for our hypothesis outputting (predicting) $h_\theta(x)$ on a training example that has label $y \in \{0, 1\}$ is:

$$\text{cost}(h_\theta(x), y) = \begin{cases} -\log h_\theta(x) & \text{if } y = 1 \\ -\log(1 - h_\theta(x)) & \text{if } y = 0 \end{cases}$$

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

☐ If $h_\theta(x) = y$, then $\text{cost}(h_\theta(x), y) = 0$ (for $y = 0$ and $y = 1$).
☐ If $y = 0$, then $\text{cost}(h_\theta(x), y) \to \infty$ as $h_\theta(x) \to 1$.
☐ If $y = 0$, then $\text{cost}(h_\theta(x), y) \to \infty$ as $h_\theta(x) \to 0$.
☐ Regardless of whether $y = 0$ and $y = 1$, if $h_\theta(x) = 0.5$, then $\text{cost}(h_\theta(x), y) > 0$.

2 Decision Boundary

Suppose you train a logistic regression classifier $h_\theta(x) = \sigma(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$. Suppose $\theta_0 = 6$, $\theta_1 = 0$, $\theta_2 = -1$. Which of the following figures represents the decision boundary found by your classifier?