Regularization

TOTAL POINTS 5

1. **You are training a classification model with logistic** `1 point`

   regression. Which of the following statements are true? Check

   all that apply.

   ☐ Adding a new feature to the model always results in equal or better performance on the training set.

   ☐ Adding many new features to the model helps prevent overfitting on the training set.

   ☐ Introducing regularization to the model always results in equal or better performance on the training set.

   ☑ Introducing regularization to the model always results in equal or better performance on examples not in the training set.

2. **Suppose you ran logistic regression twice, once with $\lambda = 0$, and once with $\lambda = 1$. One of the times,** `1 point`
   you got

   parameters $\theta = \begin{bmatrix} 26.29 \\ 65.41 \end{bmatrix}$, and the other time you got

   $\theta = \begin{bmatrix} 2.75 \\ 1.32 \end{bmatrix}$. **However, you forgot which value of**

   λ **corresponds to which value of θ. Which one do you**

   think corresponds to $\lambda = 1$?

   ○ $\theta = \begin{bmatrix} 26.29 \\ 65.41 \end{bmatrix}$

   ⦿ $\theta = \begin{bmatrix} 2.75 \\ 1.32 \end{bmatrix}$

3. **Which of the following statements about regularization are** `1 point`

   true? Check all that apply.

   ☐ Using too large a value of λ can cause your hypothesis to overfit the data; this can be avoided by reducing λ.

   ☐ Because logistic regression outputs values $0 \leq h_\theta(x) \leq 1$, its range of output values can only be "shrunk" slightly by regularization anyway, so regularization is generally not helpful for it.

   ☑ Consider a classification problem. Adding regularization may cause your classifier to incorrectly classify some training examples (which it had correctly classified when not using regularization, i.e. when $\lambda = 0$).

   ☐ Using a very large value of λ cannot hurt the performance of your hypothesis; the only reason we do not set λ to be too large is to avoid numerical problems.
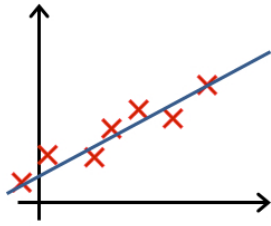
4. **In which one of the following figures do you think the hypothesis has overfit the training set?** `1 point`
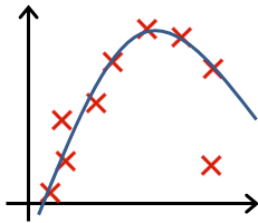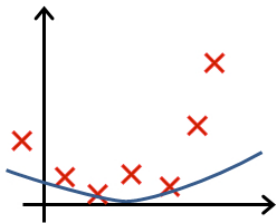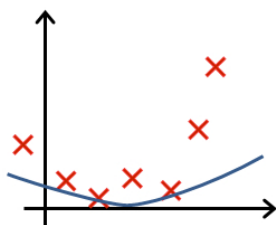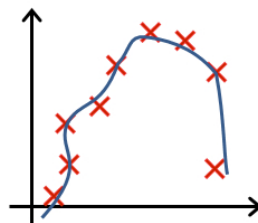
   ⦿ Figure:
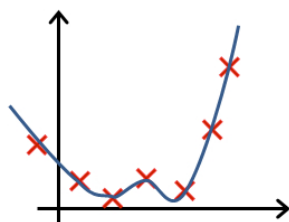
○ Figure:

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5. **In which one of the following figures do you think the hypothesis has underfit the training set?**
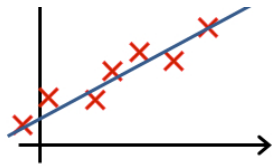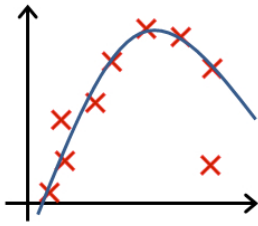
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