**1.** You are training a classification model with logistic regression. Which of the following statements are true? Check all that apply. **1 point**

- [ ] Adding many new features to the model helps prevent overfitting on the training set.
- [x] Adding a new feature 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 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, you got parameters $\theta = \begin{bmatrix} 23.4 \\ 37.9 \end{bmatrix}$, and the other time you got $\theta = \begin{bmatrix} 1.03 \\ 0.28 \end{bmatrix}$. However, you forgot which value of $\lambda$ corresponds to which value of $\theta$. Which one do you think corresponds to $\lambda = 1$? **1 point**

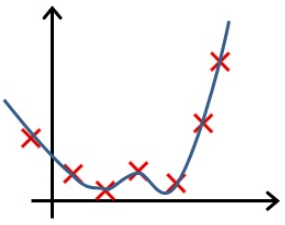
- ○ $\theta = \begin{bmatrix} 23.4 \\ 37.9 \end{bmatrix}$
- ◉ $\theta = \begin{bmatrix} 1.03 \\ 0.28 \end{bmatrix}$

**3.** Which of the following statements about regularization are true? Check all that apply. **1 point**

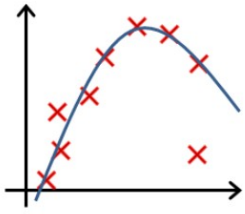
- [ ] Using too large a value of $\lambda$ can cause your hypothesis to overfit the data; this can be avoided by reducing $\lambda$.
- [ ] Using a very large value of $\lambda$ cannot hurt the performance of your hypothesis; the only reason we do not set $\lambda$ to be too large is to avoid numerical problems.
- [ ] 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.
- [x] 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 $\lambda = 0$).

**4.** In which one of the following figures do you think the hypothesis has overfit the training set? **1 point**

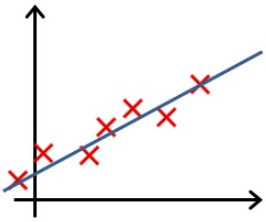
◉ Figure:



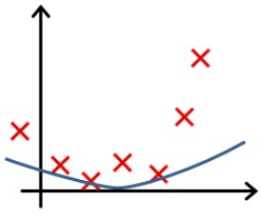
○ Figure:



○ Figure:

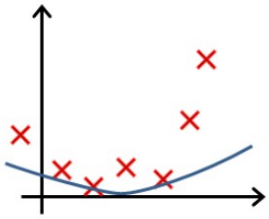


○ Figure:

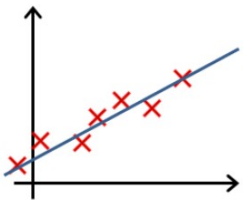


**5.** In which one of the following figures do you think the hypothesis has underfit the training set? **1 point**

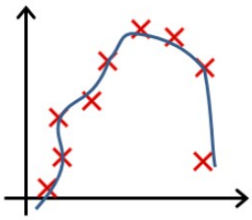
- (●) Figure:



- ( ) Figure:



- ( ) Figure:



- ( ) Figure: