



# Overfitting & Regularization in Logistic Regression

8 questions

1  
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1.

Consider four classifiers, whose classification performance is given by the following table:

	Classification error on training set	Classification error on validation set
Classifier 1	0.2	0.6
Classifier 2	0.8	0.6
Classifier 3	0.2	0.2
Classifier 4	0.5	0.4

Which of the four classifiers is most likely overfit?

- ☐ Classifier 1
- ☐ Classifier 2
- ☐ Classifier 3
- ☐ Classifier 4

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2.

Suppose a classifier classifies 23100 examples correctly and 1900 examples incorrectly. Compute accuracy by hand. Round your answer to 3 decimal places.

Enter answer here

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3.

(True/False) Accuracy and error measured on the same dataset always sum to 1.

- ☐ True
- ☐ False

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4.

Which of the following is NOT a correct description of complex models?

- ☐ Complex models accommodate many features.
- ☐ Complex models tend to produce lower training error than simple models.
- ☐ Complex models tend to generalize better than simple models.
- ☐ Complex models tend to exhibit high variance in response to perturbation in the training data.
- ☐ Complex models tend to exhibit low bias, capturing many patterns in the training data that simple models may have missed.

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5.

Which of the following is a symptom of overfitting in the context of logistic regression? Select all that apply.

- ☐ Large estimated coefficients



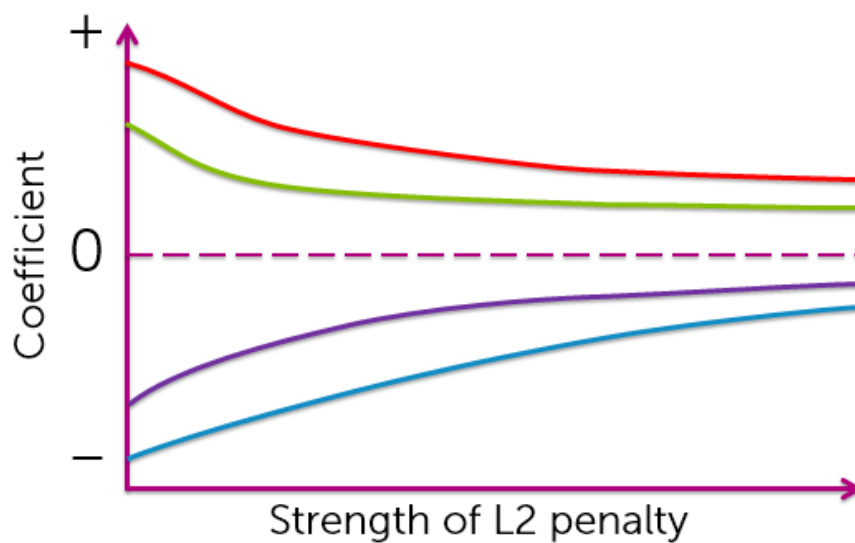
- ☒ Good generalization to previously unseen data
- ☐ Simple decision boundary
- ☐ Complex decision boundary
- ☐ Overconfident predictions of class probabilities

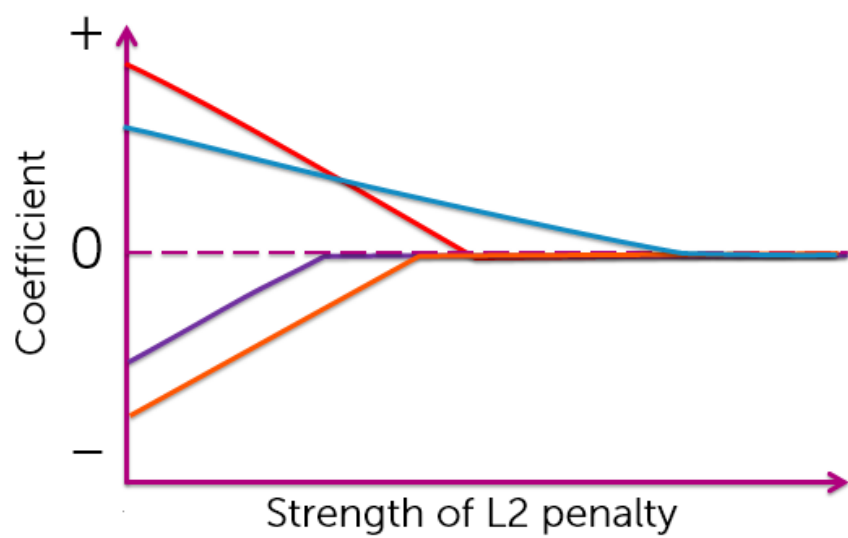
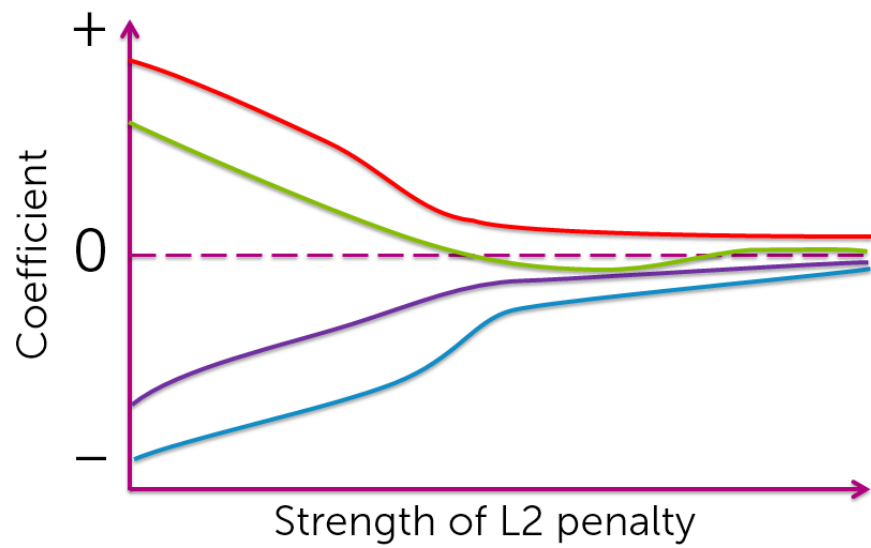
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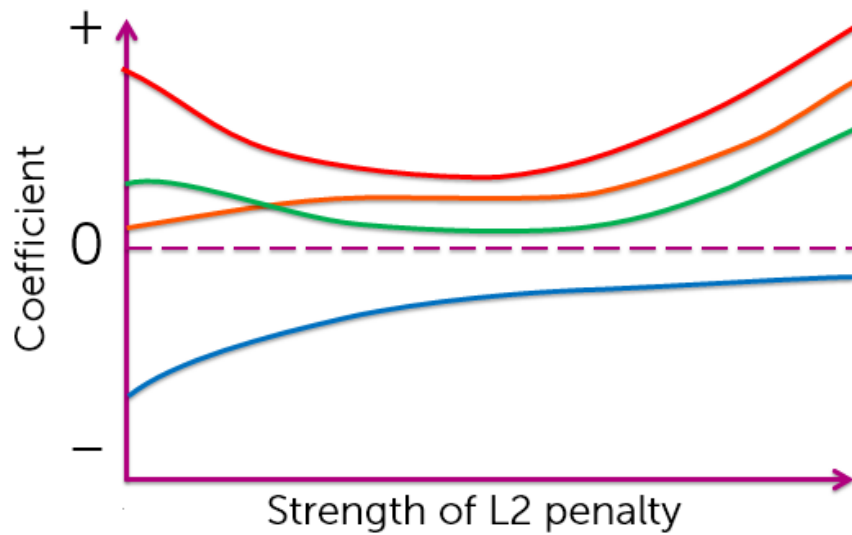
6.

Suppose we perform L2 regularized logistic regression to fit a sentiment classifier. Which of the following plots does NOT describe a possible coefficient path? Choose all that apply.

**Note.** Assume that the algorithm runs for a wide range of L2 penalty values and each coefficient plot is zoomed out enough to capture all long-term trends.





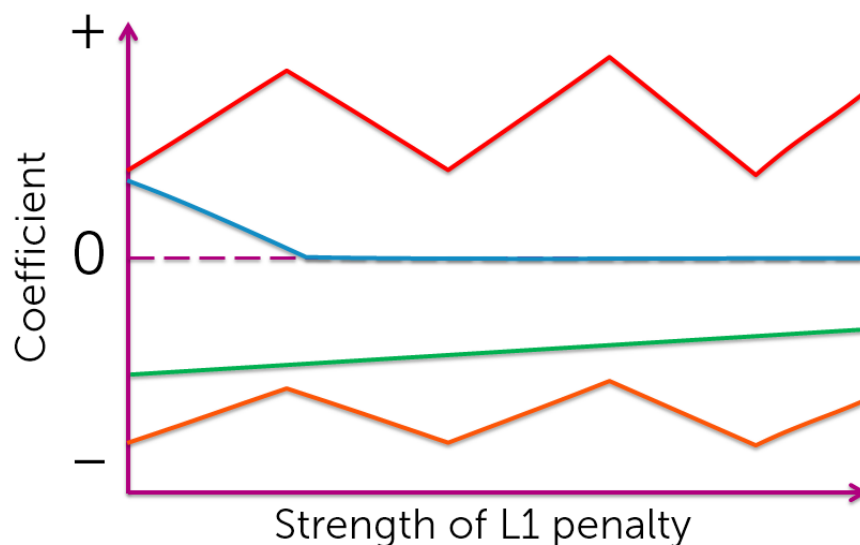


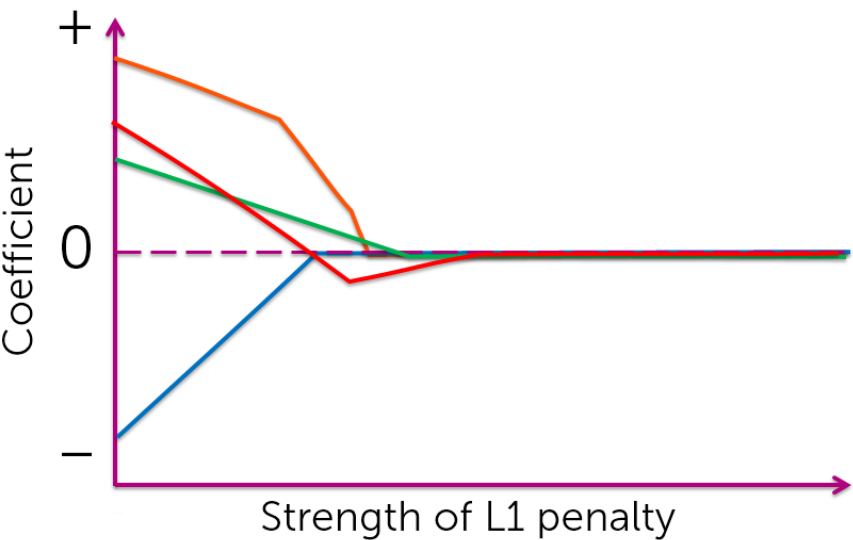
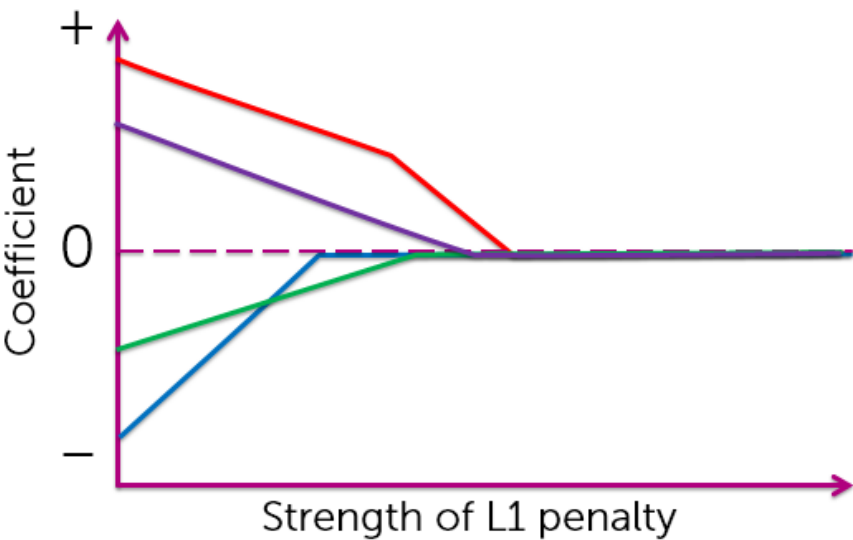
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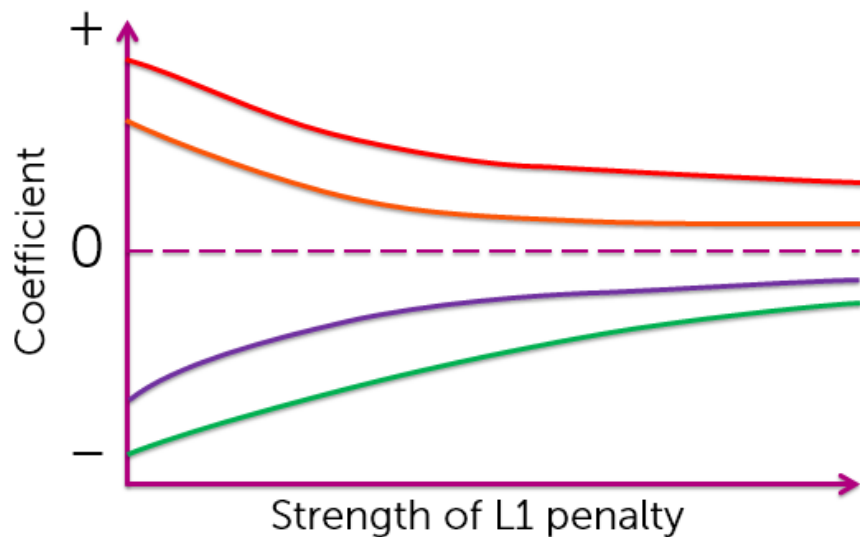
7.

Suppose we perform L1 regularized logistic regression to fit a sentiment classifier. Which of the following plots does NOT describe a possible coefficient path? Choose all that apply.

**Note.** Assume that the algorithm runs for a wide range of L1 penalty values and each coefficient plot is zoomed out enough to capture all long-term trends.







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8.

In the context of L2 regularized logistic regression, which of the following occurs as we increase the L2 penalty  $\lambda$ ? Choose all that apply.

- ☐ The L2 norm of the set of coefficients gets smaller
- ☐ Region of uncertainty becomes narrower, i.e., the classifier makes predictions with higher confidence.
- ☐ Decision boundary becomes less complex
- ☐ Training error decreases
- ☐ The classifier has lower variance
- ☐ Some features are excluded from the classifier

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4 questions unanswered

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