

Unit 4: Quiz

Due Feb 26 at 11:59pm **Points** 9 **Questions** 9
Available until Feb 27 at 2:59am **Time Limit** 60 Minutes

This quiz was locked Feb 27 at 2:59am.

Attempt History

	Attempt	Time	Score
LATEST	Attempt 1	6 minutes	9 out of 9

Score for this quiz: **9** out of 9

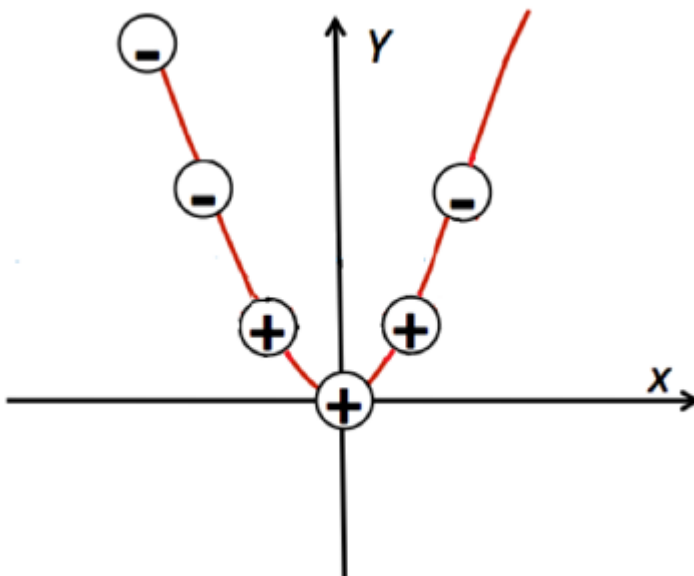
Submitted Feb 14 at 7:27pm

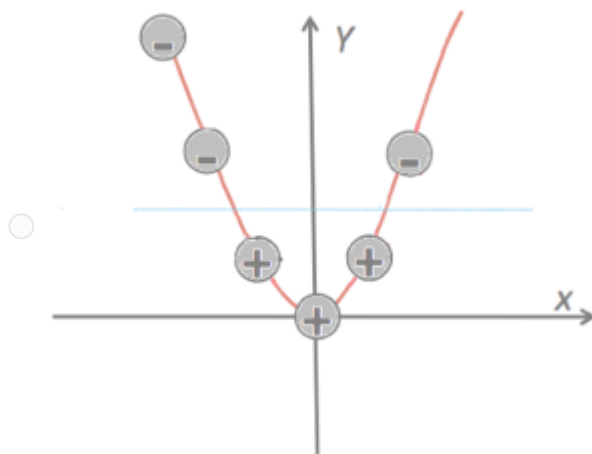
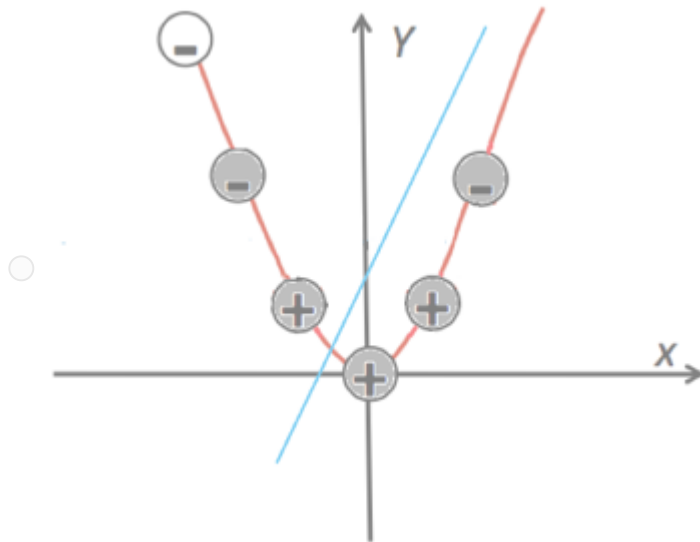
This attempt took 6 minutes.

Question 1

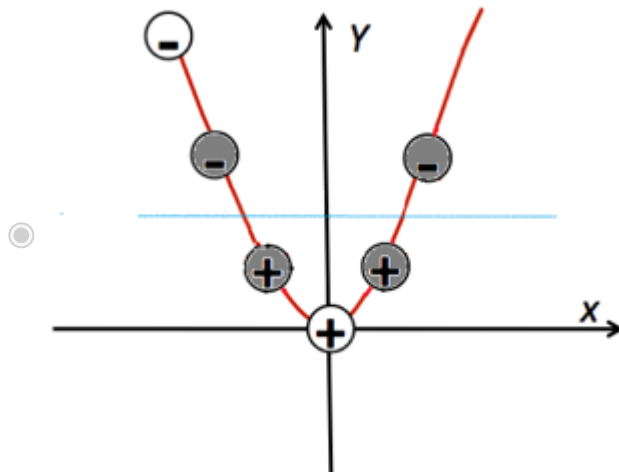
1 / 1 pts

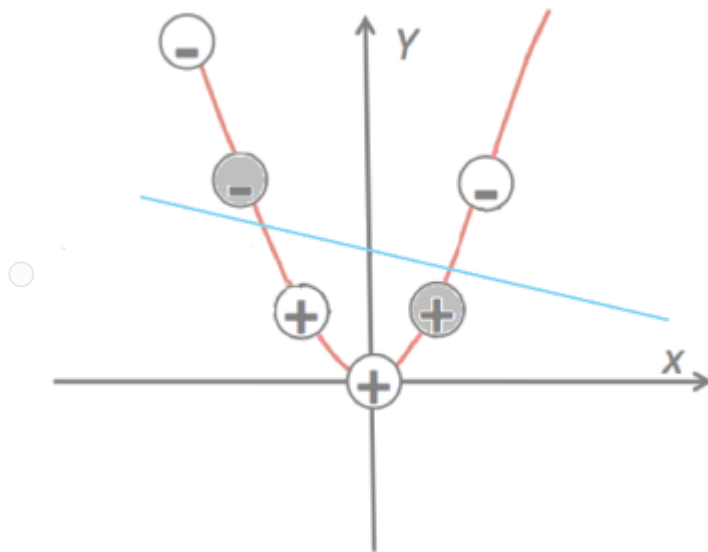
Suppose we find a feature mapping from the 1-d space to the 2-d space, and the mapped points are shown in the following figure. If the decision boundary is given by hard-margin linear SVM, which figure shows the correct decision boundary and support vector(s)?





Correct!



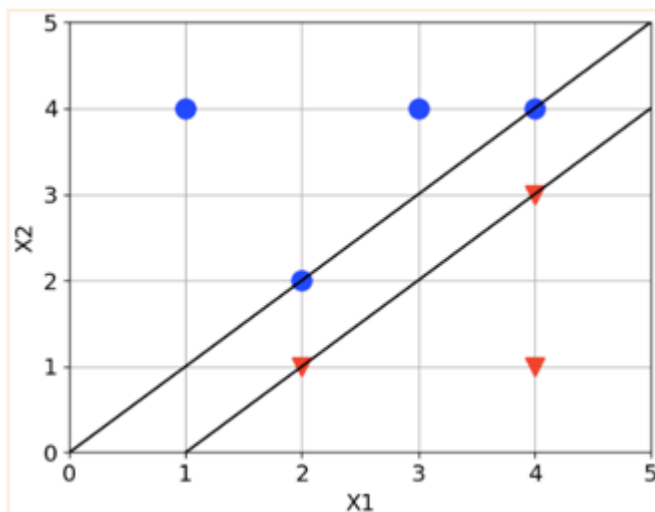


The decision boundary in this example should classify all the samples correctly, and the support vectors are the samples that are closest to the decision boundary.

Question 2

1 / 1 pts

A maximal margin classifier found the following canonical hyperplanes. What is the value of margin?



☐ $\sqrt{2}$

Correct!

☒ $\frac{\sqrt{2}}{2}$

☐ $\frac{1}{4}$

☐ $\frac{1}{2}$

The margin is the shortest distance between the two lines passing through the support vectors.

Question 3**1 / 1 pts**

Consider the figure above. What is the classification rule for the maximal margin classifier that classifies the points in blue (the circles)

Correct!

☒ $1 - 2x_1 + 2x_2 > 0$

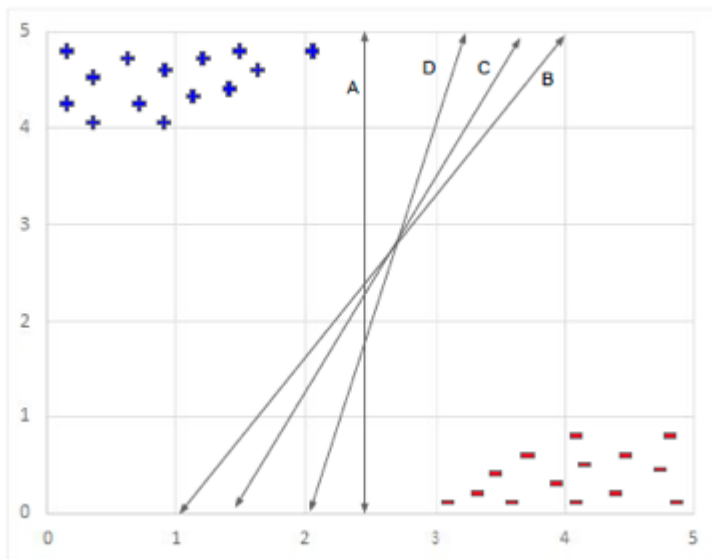
☐ $1 - x_1 + x_2 > 0$

☐ $1 - x_1 + x_2 < 0$

☐ $1 + x_1 - 2x_2 > 0$

The classifier will be at the middle of the two lines passing through the support vectors.

Question 4**1 / 1 pts**



Given this feature space with two classes (plus and minus), what is the formula for the best choice of hyperplane, in $y = mx + b$ format?

☐ C

☐ D

☒ B

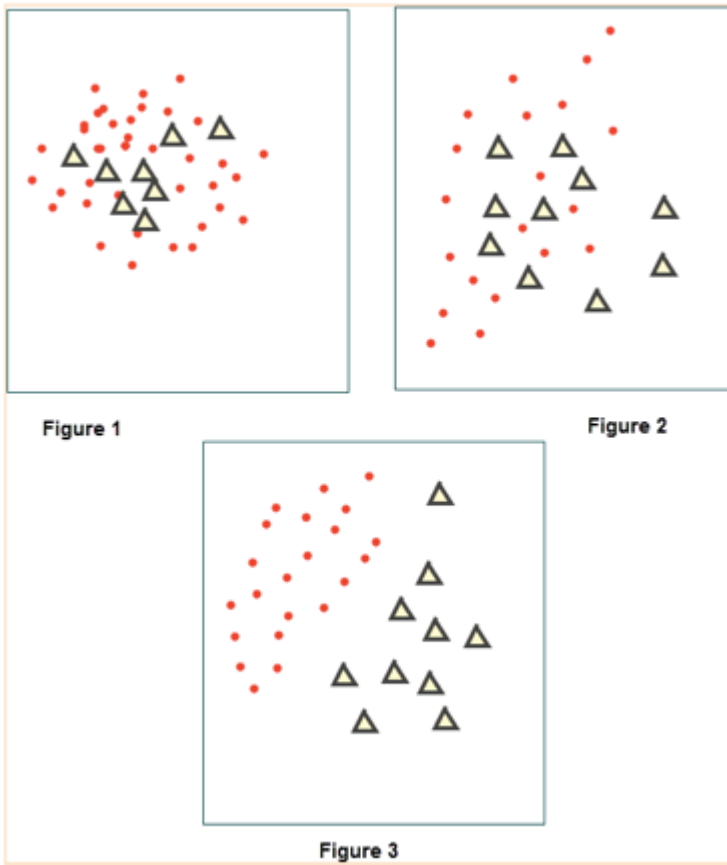
☐ A

Correct!

Question 5

1 / 1 pts

Which of the following data sets do NOT require a kernel transformation to transform data into higher dimensions where it can be separated with a hyperplane?



☐ Figure 1

☒ Figure 3

☐ Figure 2

Correct!

If the samples are not linearly separable, you can use the kernel trick.

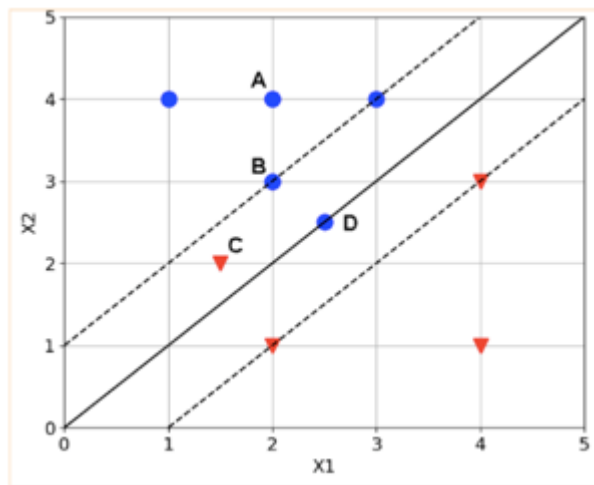
Question 6

1 / 1 pts

Which of the following is a point on the hyperplane $1 + 2X_1 + 2X_2 = 0$?

Correct!☐ $(1/2, -1/4)$ ☐ $(0, -1)$ ☒ $(-1, 1/2)$ ☐ $(-1/2, -1/2)$ **Question 7****1 / 1 pts**

In the following application, the SVM classifier is applied to a non-linearly separable data. For which points is $\xi=0$? (Select all that apply.)

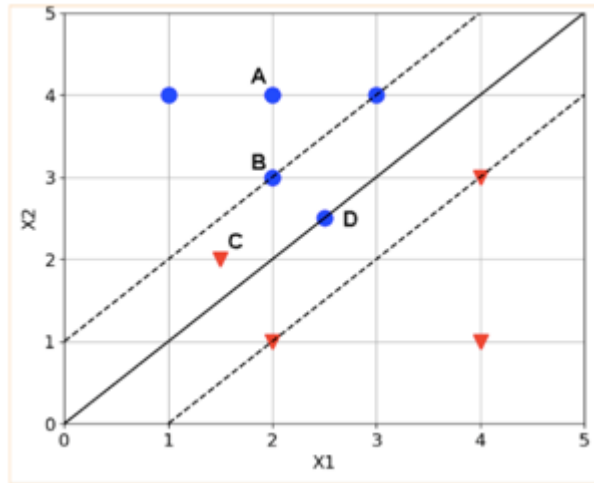
☐ Point D☐ Point C☒ Point A☒ Point B**Correct!****Correct!**

The slack is not zero if the sample is between the two dotted line.

Question 8

1 / 1 pts

In the following feature space with two classes (in blue and red respectively), the SVM classifier is applied to a non-linearly separable data. For which points is $\xi > 1$?

☐ Point B☐ Point A☒ Point C☐ Point D

Correct!

The sample which is misclassified, will have a slack > 1

Question 9

1 / 1 pts

Which of the following is true for SVMs? (Select all that apply.)



For linearly separable data of two classes, there's only one hyperplane that can correctly classify all samples.

Correct!



The support vectors alone define the decision boundary in SVM.

Correct!



SVMs use the kernel trick to effectively transform the problem into a space where the data is linearly separable.

Quiz Score: **9** out of 9