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Data Mining and Machine Learning

Quiz 4, II Semester, 2025–2026

7 April, 2026

Some questions below may have more than one correct answer. You get full credit if you select all correct options. You get partial credit if you select a non-empty, strict subset of correct options. You get zero credit if you select any incorrect option.

1. Which of these statements about the perceptron algorithm is/are **not true**? (Mark the statements that you believe are **False**.)
 - (a) The algorithm always finds a separator if the data is linearly separable.
 - (b) The time taken by the algorithm to converge is directly proportional to the width of the margin.
 - (c) The perceptron algorithm is not compatible with using kernels.
 - (d) A network of perceptrons is capable of finding separators that a single perceptron cannot.
 2. Which of these statements is/are true of support vector machines?
 - (a) When training soft-margin SVMs, if we allow a higher misclassification rate, we normally get a wider margin.
 - (b) The dual formulation of the optimization problem enables the use of kernel methods.
 - (c) We can algorithmically determine if a given function is a valid kernel.
 - (d) Expanding the input to include polynomial features (as we do in polynomial regression) is an alternative to using kernels.
 3. Which of the following is/are true of the backpropagation algorithm? Assume that the network is layered and each layer is completely connected to the next layer.
 - (a) If we initialize two nodes in the same layer with the same set of weights and biases, they will have identical weights and biases after training.
 - (b) There will always be multiple local minima equivalent to the one that we compute through gradient descent.
 - (c) Accuracy (the percentage of inputs classified correctly in a minibatch) can be used as a loss function.
 - (d) Backpropagation calculations can be speeded up through parallelization. .
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