

# Neural Networks: Learning

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1.

You are training a three layer neural network and would like to use backpropagation to compute the gradient of the cost function. In the backpropagation algorithm, one of the steps is to update

$$\Delta_{ij}^{(2)} := \Delta_{ij}^{(2)} + \delta_i^{(3)} * (a^{(2)})_j$$

for every  $i, j$ . Which of the following is a correct vectorization of this step?



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2.

Suppose **Theta1** is a 5x3 matrix, and **Theta2** is a 4x6 matrix. You set **thetaVec** = [**Theta1**(:); **Theta2**(:)]. Which of the following correctly recovers **Theta2**?



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3.

Let  $J(\theta) = 2\theta^3 + 2$ . Let  $\theta = 1$ , and  $\epsilon = 0.01$ . Use the formula  $\frac{J(\theta+\epsilon) - J(\theta-\epsilon)}{2\epsilon}$  to numerically compute an approximation to the derivative at  $\theta = 1$ . What value do you get? (When  $\theta = 1$ , the true/exact derivative is  $\frac{dJ(\theta)}{d\theta} = 6$ .)

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4.

Which of the following statements are true? Check all that apply.

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points

5.

Which of the following statements are true? Check all that apply.

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