Quiz 2: Perceptrons and Multilayer Perceptrons

1. Which one of the following is the perceptron’s input function?
   (b) \( u(x) = \sum_{i=1}^{n} w_i x_i \)  
   [98.1% correct]
   It is the sum of the product of the inputs \( x_i \) and their weights \( w_i \).

2. Which of the following graphs illustrates a step function?
   (c) graph 2  
   [81.5% correct]
   Graph 1 plots a linear function, graph 2 plots a step function (which is also called a staircase function because it has a graph resembling a staircase), and graph 3 plots a sigmoid function.

3. Perceptron-computable functions are those for which the points whose function value is 0 can be separated from the points whose function value is 1 using a line. Which functions do the following separations of the input space correspond to?
You only need to know the truth condition tables for the logical functions to answer this correctly. The perceptron separates all 1s from 0 in the case of OR and all 0s from 1 in the case of AND. The following table shows the 16 Boolean functions of two variables:

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Function $f_{14}$ is the OR-function and function $f_8$ is the AND-function. A perceptron separates the input space into two half-spaces. For points belonging to one half-space the result of the computation is 0, for points belonging to the other it is 1.

4. What is the delta rule? (c) a gradient descent learning rule for updating the weights of the inputs in MLPs

5. What is the difference between Wickelphones and Wickelfeatures?
   (b) Wickelphones represent a phoneme and its immediate context; Wickelfeatures are coarse grained encodings of Wickelphones

6. What is the error function used in the backpropagation algorithm?
   (c) the mean squared error

7. Which of the following is not a property of Parallel Distributed Processing (PDP) models?
   (c) the network is able to form generalizations from examples