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Homework 6

Problem 1.1:

Exercise 14-

- a) Yes
- b) Yes
- c) Yes
- d) No

Exercise 15-

- a) For the AND function we can use the $\text{sign}()$ function. Essentially, the AND function is if both inputs resolve to true, and we can set up an expression to $-1.5 + x_1 + x_2$. This way (assuming $1 == \text{true}$) if both inputs are 1, then that is the only time the sign function will be positive, else it will be negative.

For the OR function we can continue using the sign function but instead this time we need it so that only one true value can push the sign function over the threshold. The expression we can use is $-0.5 + x_1 + x_2$, this way only a single true value can result in a true result since $-0.5 + 1 = +0.5$.

- b) Linear functions can limit multi-layer neural networks because with more layers there are more complicated curves to fit. However with a linear function there will always be some linear combination to get to some

output. This means that a multi-layered neural network with a linear activation function is essentially a perceptron.