1. In this problem you are asked to design a multi-layer perceptron that implements the binary decision region depicted in Fig. 1. The two regions shaded in grey should map to +1 and the rest to −1.
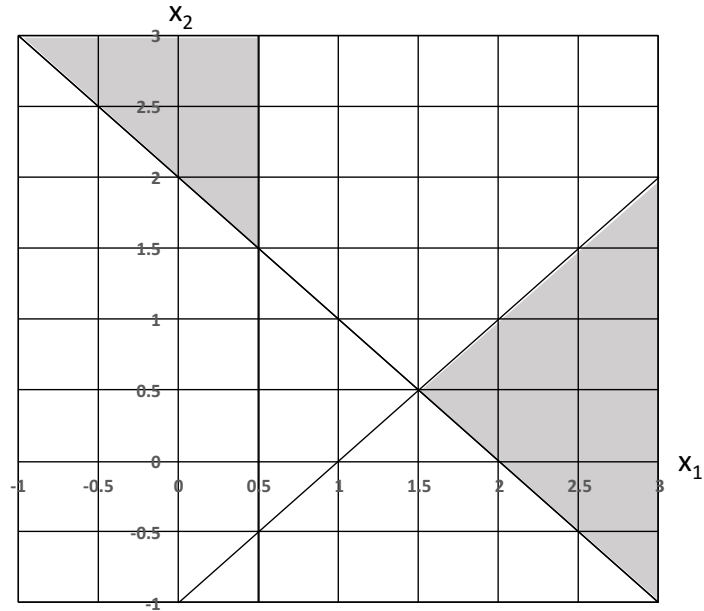

Figure 1: Decision region of a multi-layer perceptron.

First, make a clear drawing of the architecture of your multilayer-perceptron, clearly indicating the weights associated with each edge. Second, list your edge weights in standard form in a weight matrix $W^{(l)}$ for each layer of weights. Finally, describe (clearly & concisely!) what is going on at each layer to describe the functioning of your architecture. (Additional space for your work and solution is provided on the next page.)

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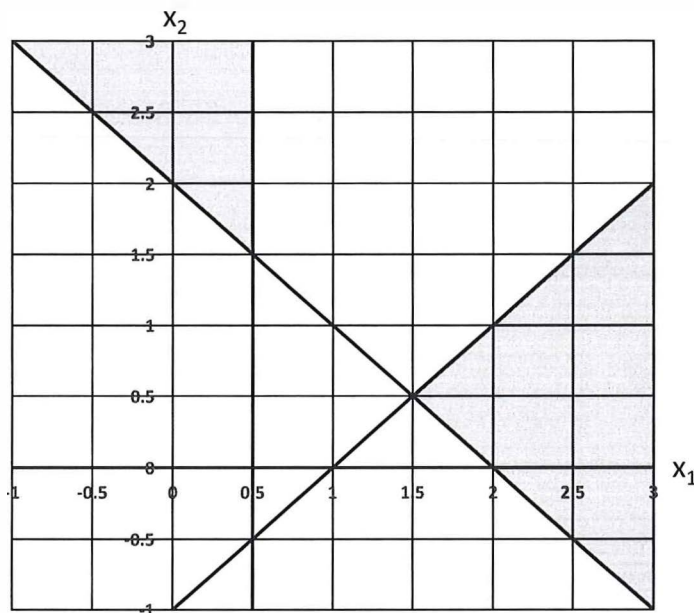

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Implement the 3 lines

$$h_a(\underline{x}) = sign\ (x_1 + x_2 - 2)$$

$$h_b(\underline{x}) = sign\ (x_1 - \tfrac{1}{2})$$

$$h_c(\underline{x}) = sign\ (x_1 - x_2 - 1)$$

$h_a \cap \bar{h}_b$

$h_a \cap h_c$