HW1: NO deep learning library! Maybe only numpy!

Q1: Draw XOR gate with weight and bias. You can find the answer by simple googling. The purpose of this question is not to get the answer but I want you to get familiar with the concept.

Q2. Given two data points, [1/2, 1] and [1, 1/2]. And their label is 1 and -1 for each. Write a code to update weight vector for the classifier. This is shown in the class. I just changed the number. Don't forget the bias!

a) Write a code. Assume eta=1/2.
How many iterations are needed when all the results are correct?

b) Write a code. Assume eta=1/2. Now, add one same data. So your [1, 1/2] and the label is -1 because it is just the same data. How many iterations do you need now?

c) Draw a decision boundary for a) and b).

d) Is it somehow related to the "density" of the data? Why?

e) Would neural net performance/accuracy be related to the data? Why?

Hint: for a) and b), you won't need more than 4~5 iterations. Easy way is do it by hand and debug your code.

Q3. Train Logic gates: AND, OR, NOT just like Q2. Compare with the weights discussed during the class. Generate X and Y data according to truth table. No deep learning library! Hint: you only need to change the data set.

Q4. Who is Frank Rosenblatt in one sentence?