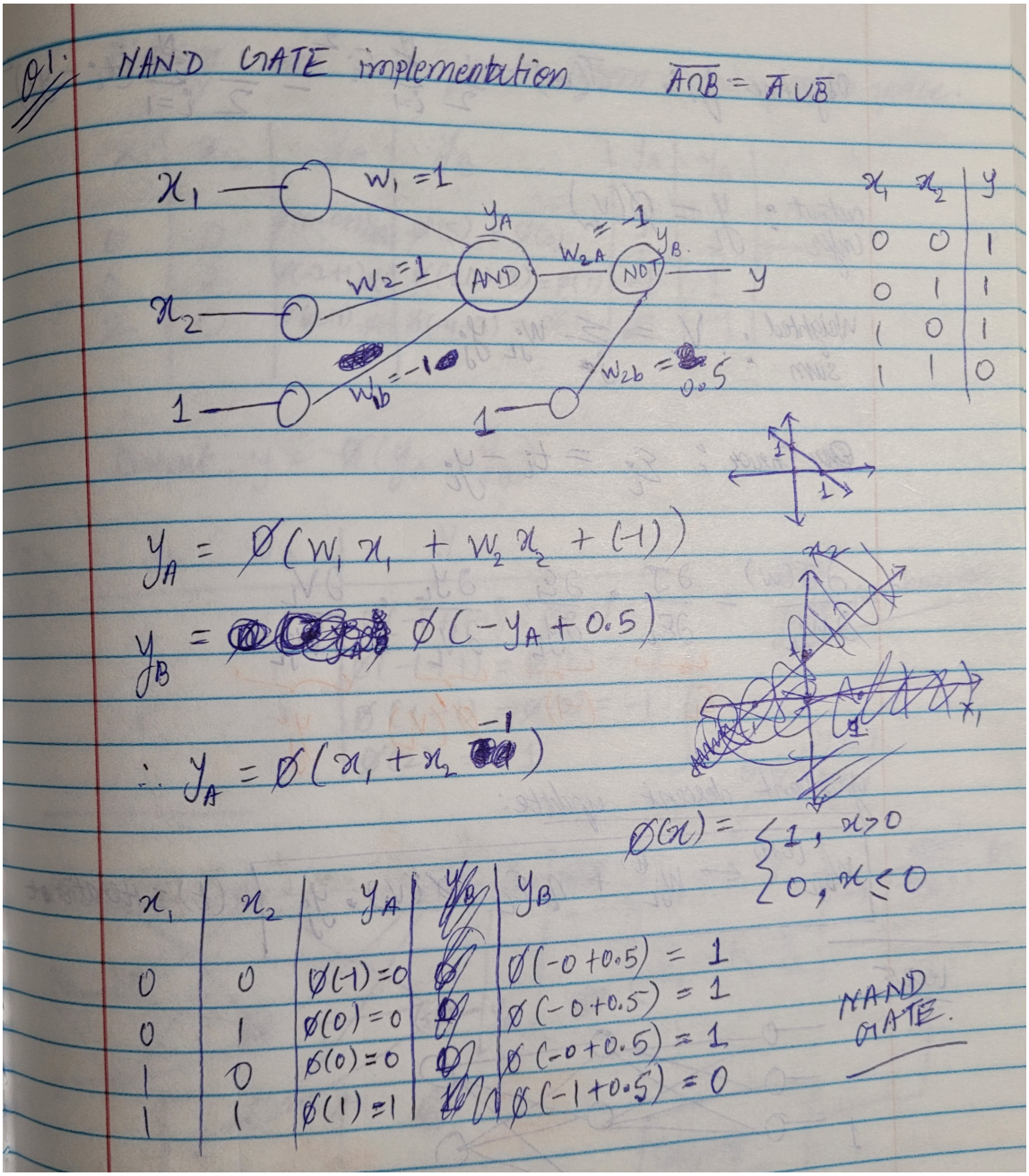
Short Assignment 4

Problem 1 (3 points)

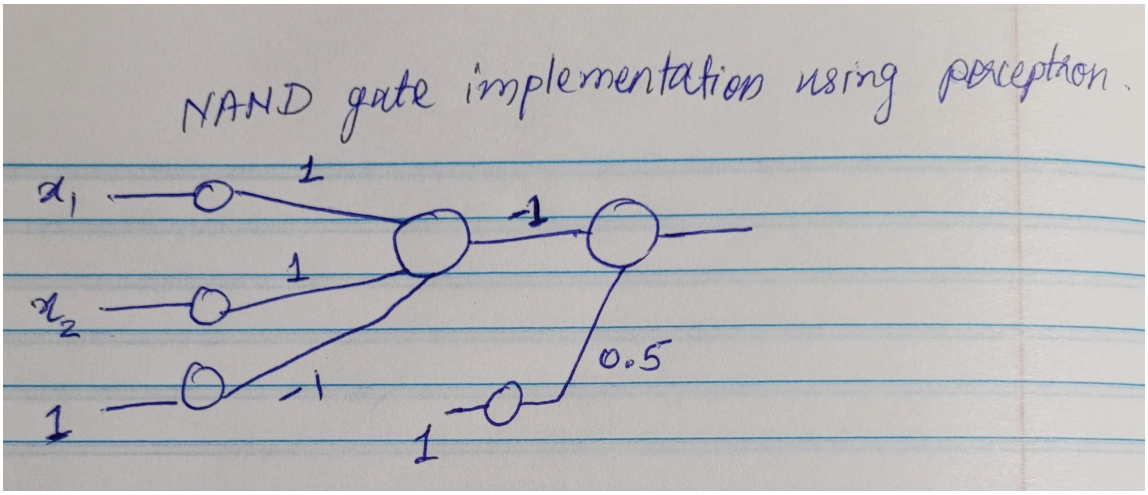
Draw a Perceptron to implement the NAND gate $\overline{A \cap B} = \overline{A} \cup \overline{B}$ using the threshold activation function $\phi(x) = \begin{cases} 1, & x > 0 \\ 0, & x \leq 0 \end{cases}$.

Solve this problem by hand and show your work.



x_1	x_2	y
0	0	1
0	1	1
1	0	1
1	1	0

x_1	x_2	y_A	y_B
0	0	$\phi(-1) = 0$	$\phi(-0 + 0.5) = 1$
0	1	$\phi(0) = 0$	$\phi(-0 + 0.5) = 1$
1	0	$\phi(0) = 0$	$\phi(-0 + 0.5) = 1$
1	1	$\phi(1) = 1$	$\phi(-1 + 0.5) = 0$

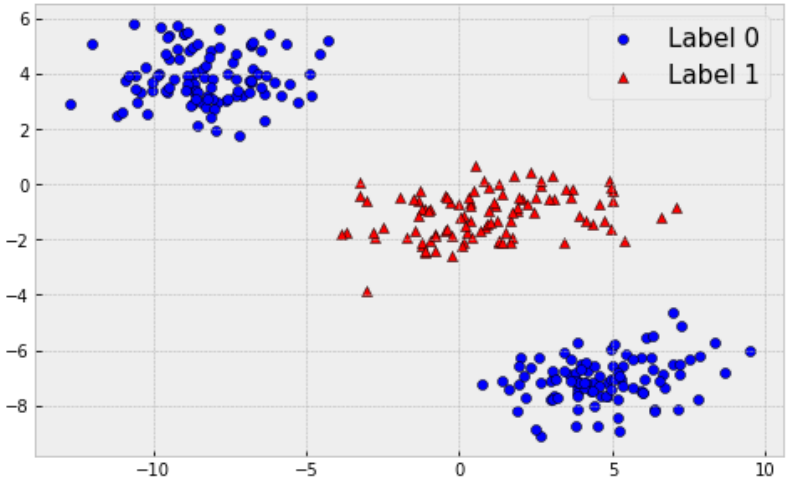


Problem 2 (6 points)

Consider the following two-dimensional data set and desired values for a two-class classification problem:

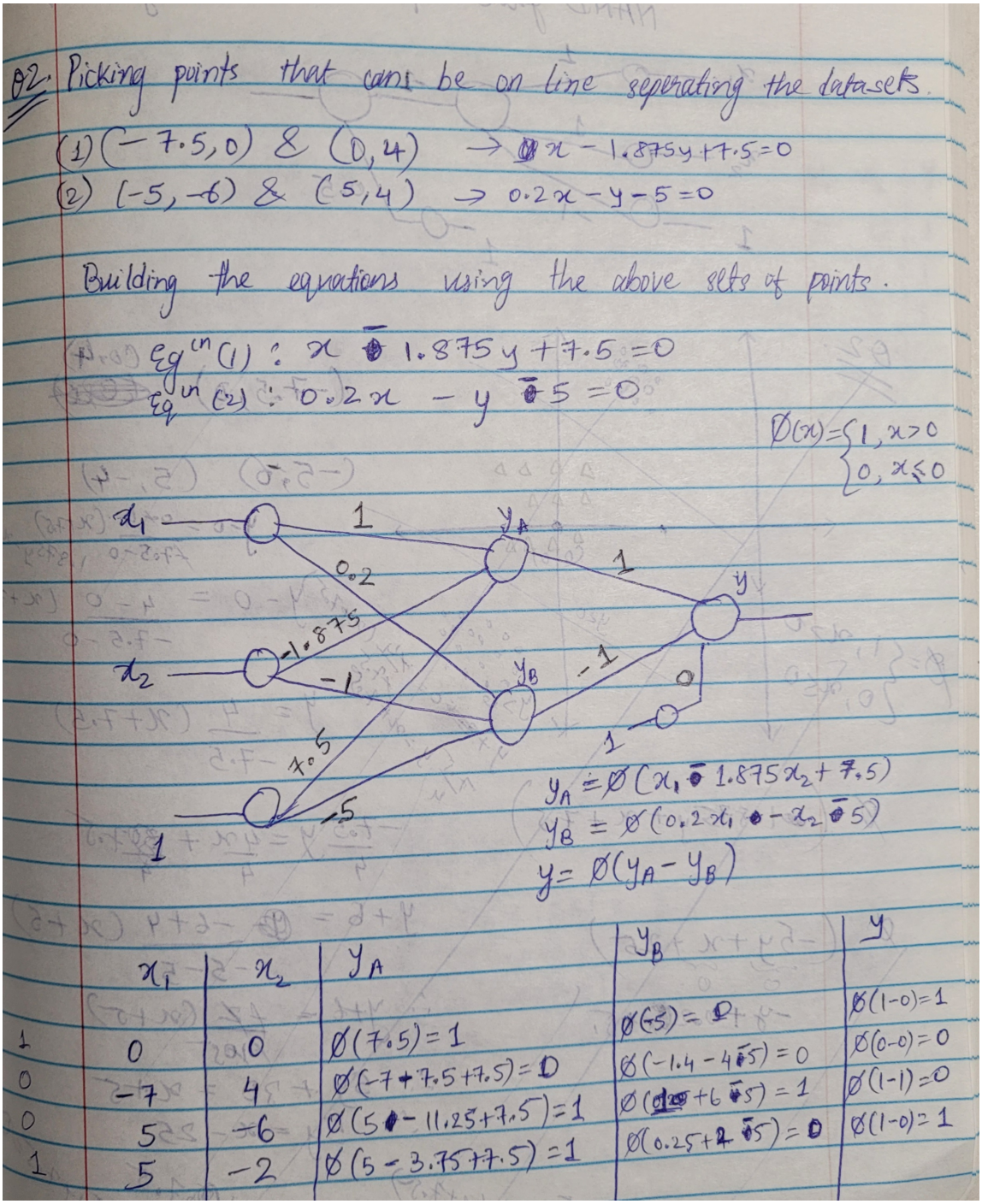
In [2]:
```
from IPython.display import Image
Image('figures/classification.png', width=400)
```

Out[2]:



For the hard-limit activation function $\phi(x) = \begin{cases} 1, & x > 0 \\ 0, & x \leq 0 \end{cases}$, define a neural network structure and the associated parameter values that can solve this classification problem with zero error on this dataset.

Solve this problem by hand and show your work.



Submit Your Solution

Confirm that you've successfully completed the assignment.

Along with the Notebook, include a PDF of the notebook with your solutions.

`add` and `commit` the final version of your work, and `push` your code to your GitHub repository.

Submit the URL of your GitHub Repository as your assignment submission on Canvas.
