Compsci 571 HW6

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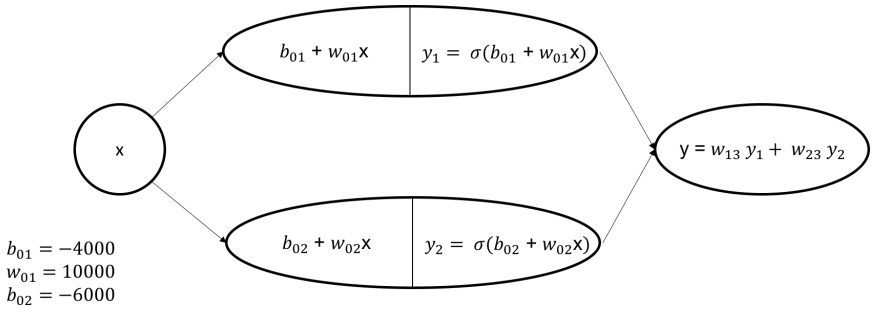
1 Neural Networks and Universal Approximation Theorem

1.1

(a) The NN architecture is like following:



$b_{01} = -4000$
$w_{01} = 10000$
$b_{02} = -6000$
$w_{02} = 10000$
$w_{13} = 1$
$w_{23} = -1$

The implementation is in the Jupyter notebook.

The minimal number of hidden neurons is 2, because the bump is a combination of 2 step functions.

(b) In the NN, w_{01} determines the steepness of the step-up part of the bump, w_{02} determines the steepness of the step-down part of the bump. $-\frac{b_{01}}{w_{01}}$ determines the step-up location, $-\frac{b_{02}}{w_{02}}$ determines the step-down location. And w_{13} and w_{23} determine the height of the bump.

1.2

(a)

(b)

(c)