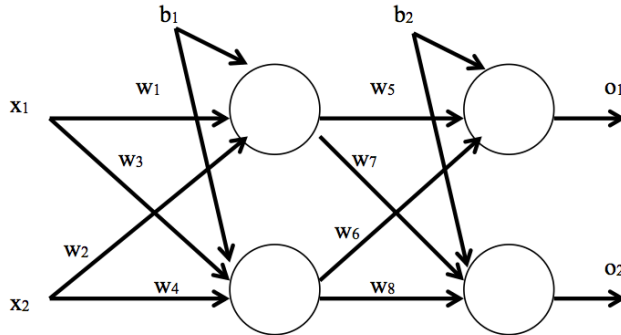


Homework 2
Due: 11:59pm February 4

1. (20 pts) Compute the output of the following neural network, when $x_1 = 1$, $x_2 = 2$, $w_1 = 0.1$, $w_2 = 0.2$, $w_3 = 0.3$, $w_4 = 0.4$, $w_5 = 0.2$, $w_6 = 0.1$, $w_7 = 0.4$, $w_8 = 0.3$, $b_1 = 0.1$, and $b_2 = 0.2$. The activation functions of the neurons are sigmoid function. Provide all steps.



2. (30 pts) Assume the output in the training for input $(x_1, x_2) = (1, 2)$ is $(o_1, o_2) = (0, 1)$, the current w 's are the values in question 1, and the loss function is defined as

$$L = (o_1 - \hat{o}_1)^2 + (o_2 - \hat{o}_2)^2,$$

compute $\frac{\partial L}{\partial w_3}$ and $\frac{\partial L}{\partial w_7}$. Provide all steps.

3. (50 pts) Write a computer program in either Python or Matlab to implement a two-layer neural network to use the first two column data to predict the three column data in the attached dataset. Randomly select 90% of the data for training and test on the rest 10% of the data.