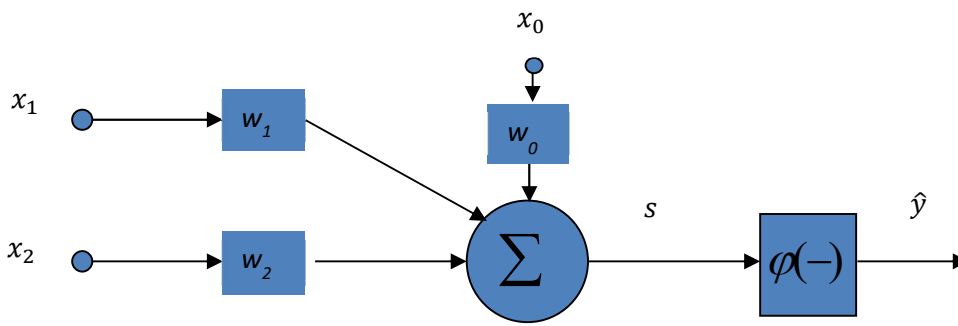


McMaster University	W Booth School of Engineering Practice and Technology
SFWRTECH 4AI3 Artificial Intelligence	<b>Assignment # 3</b>

Assume the following ANN with a single neuron.

- 1) Calculate the outputs for the inputs  $x(1) = (x_1, x_2) = (0.6, 2.1)$  and  $x(2) = (x_1, x_2) = (2, 1)$ , where  $(w_0, w_1, w_2) = (-1.5, 0.5, 1)$  and the activation function is sigmoid  $\phi(s) = \frac{1}{1+e^{-s}}$ .
- 2) Calculate the MSE loss function.
- 3) If the real outputs (ground truth) at these data points are  $y(1) = 2, y(2) = -1$ , calculate the  $\frac{\partial J}{\partial w}$ , where  $J$  is the mean squared error.



**Note:** You may write a python program to answer the above questions or write it on the paper.

- If you choose to write a program, submit it as a single python program in the format of .ipynb file runnable on Colab. The answer for each of the above questions must be printed when the program runs.
- If you choose to answer in paper, show your calculation for each question. Please write it neatly and take photo and make the whole pages as a **single PDF file**. You may also select to type it, save it as a single PDF file and submit the PDF file.