Assignment 1

1.1

$$Z = w_0 + \sum_{i=1}^{n} w_i x_i$$

$$ReLU = \max(0, Z)$$

Iteration 1

$$Z_1 = w_0 + w_1 x_1 + w_2 x_2$$
$$= 3 + (-3 \times 3) + (-1 \times 2)$$
$$= 3 + (-9) + (-2)$$
$$Z_1 = -8$$

$$Z_2 = 3 + (3 \times -1) + 2 \times (-2)$$
$$= 3 - 3 - 4$$
$$= -4$$

$$Z_3 = 3 + (-4 \times 3) + (2 \times 0)$$
$$= 3 - 12 + 0$$
$$= -9$$

$$Z_4 = 3 + (0 \times 3) + (2 \times -3)$$
$$= 3 + 0 - 6$$
$$= -3$$

$$Z_1 = ReLU(0, -8) = 0$$
$$Z_2 = ReLU(0, -4) = 0$$
$$Z_3 = ReLU(0, -9) = 0$$
$$Z_4 = ReLU(0, -3) = 0$$

$$z_5 = 3 + (0 \times -4) + (0 \times 2) + (0 \times 4) + (0 \times 0)$$
$$= 3$$

$$z_6 = 3 + (0 \times -3) + (0 \times -5) + (0 \times 1) + (0 \times -1)$$
$$= 3$$

$$z_7 = 3 + (0 \times -1) + (0 \times 3) + (0 \times 2) + (0 \times -3)$$
$$= 3$$

$z_5 = \text{ReLU} = (0, 3) = 3$
$z_6 = \text{ReLU} = (0, 3) = 3$
$z_7 = \text{ReLU} = (0, 3) = 3$

$$y = 3 + (3 \times -5) + (3 \times 4) + (3 \times -3)$$
$$= 3 + (-15) + 12 + (-9)$$
$$y = -9$$

$$\hat{y} = \frac{1}{1 + e^{-(-9)}} = \frac{1}{1 + e^{9}} = 0.0001234$$