

3)

a)

$$w_0 = 1 \quad \eta = 0.1 \quad U(w) = \frac{1}{2}(wx - y)^2$$

$$\nabla U(w) = \frac{\partial U(w)}{\partial w} = x(wx - y)$$

i.)  $x=1, y=1$

$$w_{i+1} = w_i - \eta \frac{\partial U(w)}{\partial w} \Rightarrow w_1 = w_0 - \eta \frac{\partial U(w)}{\partial w} = 1 - (0.1)(1)(1 - 1) = 1$$

$$\Rightarrow w_1 = 1$$

ii.  $x=1, y=-1$

$$w_1 = 1 - (0.1)(1)((1)(1) + 1) = 1 - (0.1)(2) = 0.8 = w_1$$

4)

