Cairo University
Faculty of Computers and Information
Departments of Computer Science
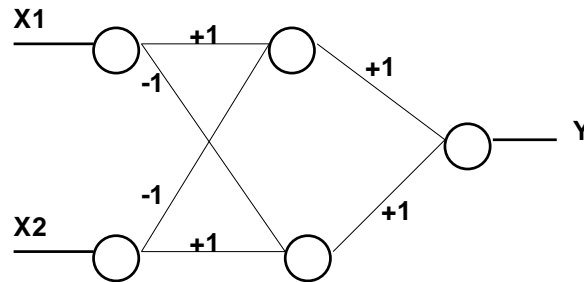**Neural Networks**
Time 1 hr

1- Derive the Generalized Delta Rule for output layer.

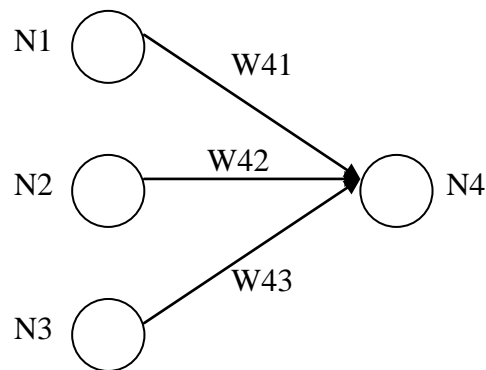**2-** Given the following feedforward neural network with weights,

and applying the following activation function,

$$f(x) = \begin{cases} 1 & x > 0 \\ 0 & x \le 0 \end{cases}$$

Compute the outputs Y for inputs (X1, X2) equal to the following,
        (0,0), (0,1), (1,0), (1,1).
What function do you think this network emulates.

3- A fragment of a NN comprising 4 neurons is shown below. N1, N2 and N3 are on the hidden layer and N4 is on the output layer. I(N1)=0.9 and o(N4)=0.5, error e at N4=0.3. weights w41=0.6, w42=0.4 and w43=0.7 and learning rate = 0.03. Update the value of w41 by backpropagation algorithm. Also compute the back-propagated error at neuron N1

4- Given the following weights of feedforward neural network

$$[W^h] = \begin{bmatrix} 2.1 & 1.4 \\ 3.8 & 4.3 \end{bmatrix} \qquad [W^o] = \begin{bmatrix} 1.5 & 2.6 \\ 5.1 & 3.2 \end{bmatrix} \quad \text{and } [X] = \begin{bmatrix} 0.32 \\ 0.68 \end{bmatrix}$$

and sigmoidal activation function on both output and hidden layers…
Compute y1 and y2.

AMR BADR