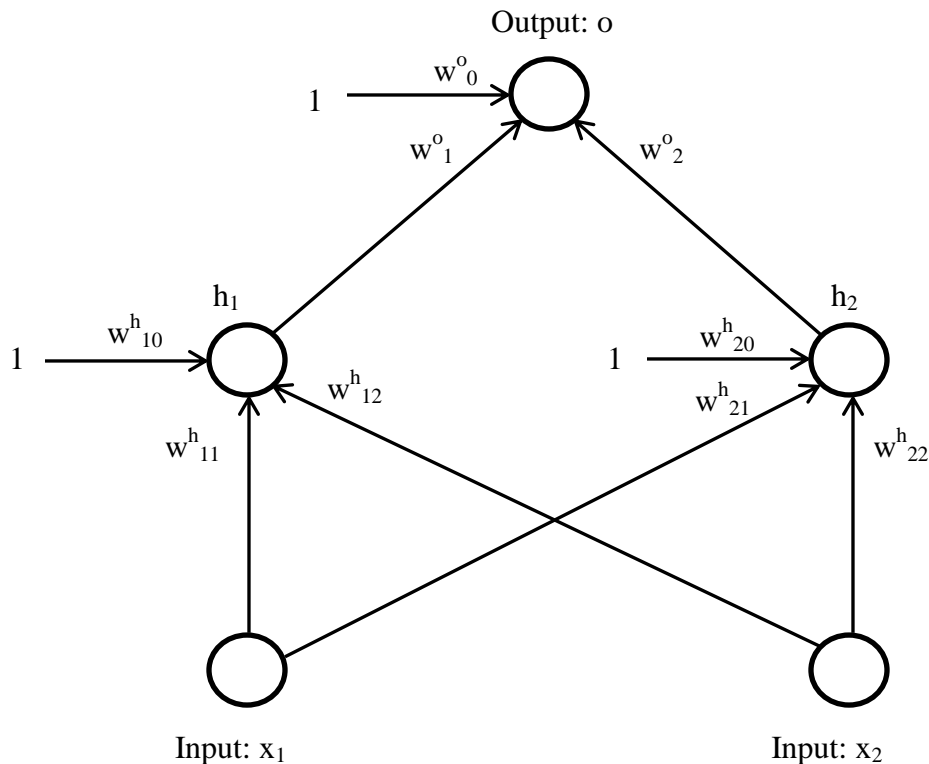


## Backpropagation Sample Program – CS 470/670

The program `backprop.c` is a simulation of backpropagation learning in an extremely simple network consisting of only five neurons:



When you start the program, you are asked to enter the first exemplar for training. Please enter the three values  $x_1$ ,  $x_2$ , and  $y$  (desired output) separated only by spaces. All of these values must be between 0 and 1. If you would like to enter another exemplar, press 'y', and enter the next three values, and so on. Then enter the learning parameter  $\eta$ ; values around 5 usually work fine.

For each input vector, the program will print the entire network state, including the input, weights, hidden layer outputs, the network output, and the desired output vector. Most likely the actual output values are quite different from the desired ones. In order to change that, i.e., to train the network, just press a button, and one training epoch is executed. This means that each exemplar is trained exactly once, with the order of exemplars being random. Again, the entire network status is shown after each weight adjustment so that you can observe the training process. Just keep a key pressed to let the epochs run through very quickly. If the training set is learnable, the actual output values should approach the desired ones as the training progresses.

Press 'x' to exit the program, and restart it for your next experiment.

Have fun!