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ENEE 434 Spring 2003
To Do #1
Not for grading but for good experience

1. Create a neural network using cut and paste from the Help for the Matlab Neural Network Toolbox:

Open the Neural Network Toolbox Help from the Matlab Launch Pad.

Go to Functions Listed Alphabetically and choose newff which will give a feed forward neural network.

Go to the Examples and cut and paste into the Matlab Command Window (enter each as it is pasted in). In version 6.1 release 12 these will be the sequence of inputs P for a single input neural network on which to train

```
P = [0 1 2 3 4 5 6 7 8 9 10];
```

and the corresponding outputs, one for each input

```
T = [0 1 2 3 4 3 2 1 2 3 4];
```

Then the definition of a two layer network with five neurons in the first, input, layer and one in the next, output, layer with tansig=tanh as the nonlinearity for each of the five input layer neurons. The input signals are to be in the range 0<=u<=10 by the first argument

```
net = newff([0 10],[5 1],{'tansig' 'purelin'});
```

The name of this network is net; you could change that to something else but will need to use the name you choose wherever "net" is used in examples.

Next do a simulation to see that the outputs do not match the desired ones, T:

```
Y = sim(net,P);
plot(P,T,P,Y,'o')
```

In this plot the piecewise linear line is T , the one with circles is the actual output Y, and P is on the x axis.

Next is the trained by running 50 times through the set P,T:

```
net.trainParam.epochs = 50;
net = train(net,P,T);
Y = sim(net,P);
plot(P,T,P,Y,'o')
```

The result should be quite good in that Y should be close to T. Look for the weight and bias values for each layer.

net.IW{.,.}; net.b{.} and net.LW{.,.}; net.b{.}

2. Create a simulink system for the network just created.

a) First do this by using the simulink neural network generator

```
gensim(net)
```

Once this is created run it with single constant inputs taken from P and then change the constant input to a ramp input and run; plot and see that the output looks like T. Next check the weights and round them to three decimal places and rerun.

b) Create your own simulink network by using the neural network blockset. Use the weights obtained in a) into gain blocks (note that you probably want to set the property K*u in the gain setting window).