

ENEE434**Solution to midterm makeup****Problem 1**

$$a_1(t) = iw_{1,1} p(t) + iw_{1,2} p(t-1) = 2 p(t) + p(t-1)$$

$$a_2(t) = lw_{2,1} a_1(t) + lw_{2,2} a_1(t-1) = a_1(t) + 2 a_1(t-1)$$

$$t=0 : a_1(0), a_2(0) = 0$$

$$t=1 : a_1(1) = 2 p(1) + p(0) = 2 \cdot -2 = -4$$

$$a_2(1) = a_1(1) + 2 a_1(0) = -4$$

$$t=2 : a_1(2) = 2 p(2) + p(1) = 2 \cdot 1 + (-2) = 0$$

$$a_2(2) = a_1(2) + 2 a_1(1) = 0 + 2 \cdot -4 = -8$$

$$t=3 : a_1(3) = 2 p(3) + p(2) = 2 \cdot 5 + 1 = 11$$

$$a_2(3) = a_1(3) + 2 a_1(2) = 11 + 2 \cdot 0 = 11$$

$$t=4 : a_1(4) = 2 p(4) + p(3) = 2 \cdot -3 + 5 = -1$$

$$a_2(4) = a_1(4) + 2 a_1(3) = -1 + 2 \cdot 11 = 21$$

$$t=5 : a_1(5) = 2 p(5) + p(4) = 2 \cdot -2 + -3 = -7$$

$$a_2(5) = a_1(5) + 2 a_1(4) = -7 + 2 \cdot -1 = -9$$

The outputs will cyclicly repeat since the inputs cyclicly repeat, and the weight matrices are constant.

The results can be checked by MatLab as follow:

```
net1 = newlin([-5 5], 1, [0 1]);
```

```
net2 = newlin([-5 5], 1, [0 1]);
```

```
net1.IW{1,1} = [2 1];
```

```
net2.IW{1,1} = [1 2];
```

```
p = [-2 1 5 -3 -2];
```

```
a1 = sim(net1, p)
```

a1 =

```
[-4] [0] [11] [-1] [-7]
```

```
a2 = sim(net2, a1)
```

a2 =

```
[-4] [-8] [11] [21] [-9]
```