

EE402 Discrete Time Systems - MP-7

Appendices

A Simulation Results For Question 5

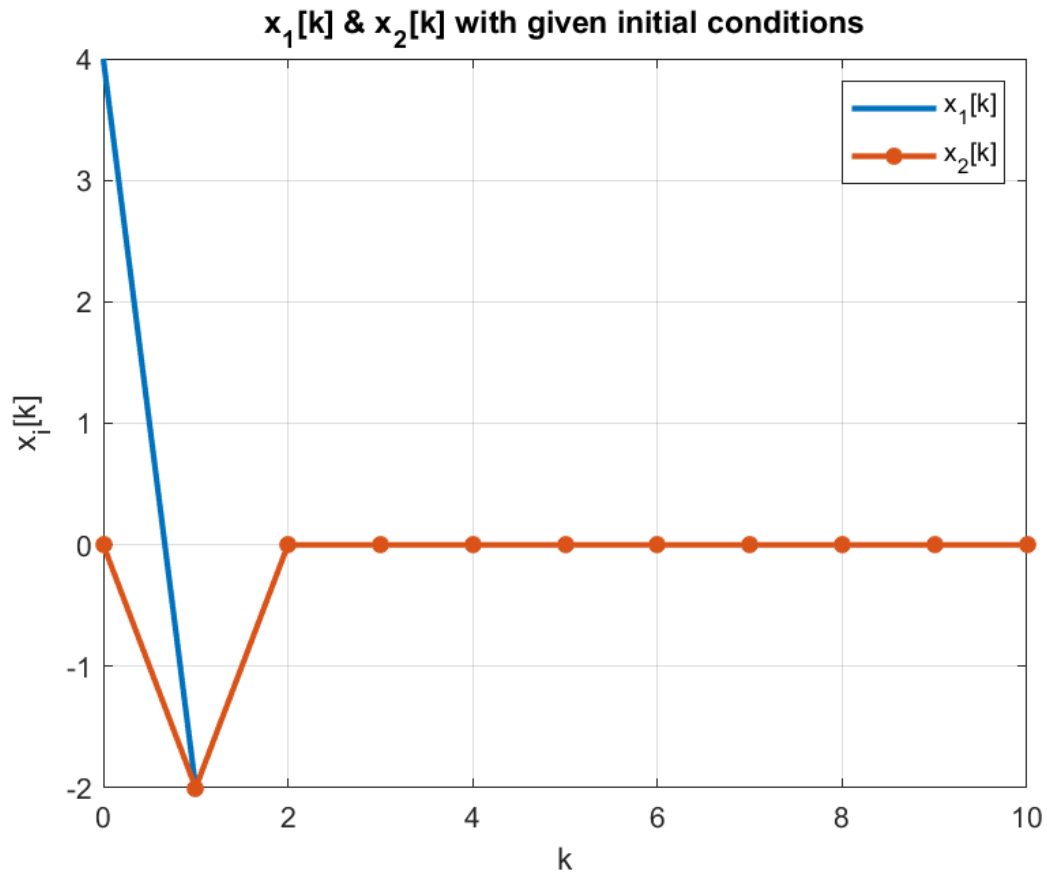


Figure 1: Response of each of the state variables from $k = 0$ to $k = 10$ for Question 5 part a



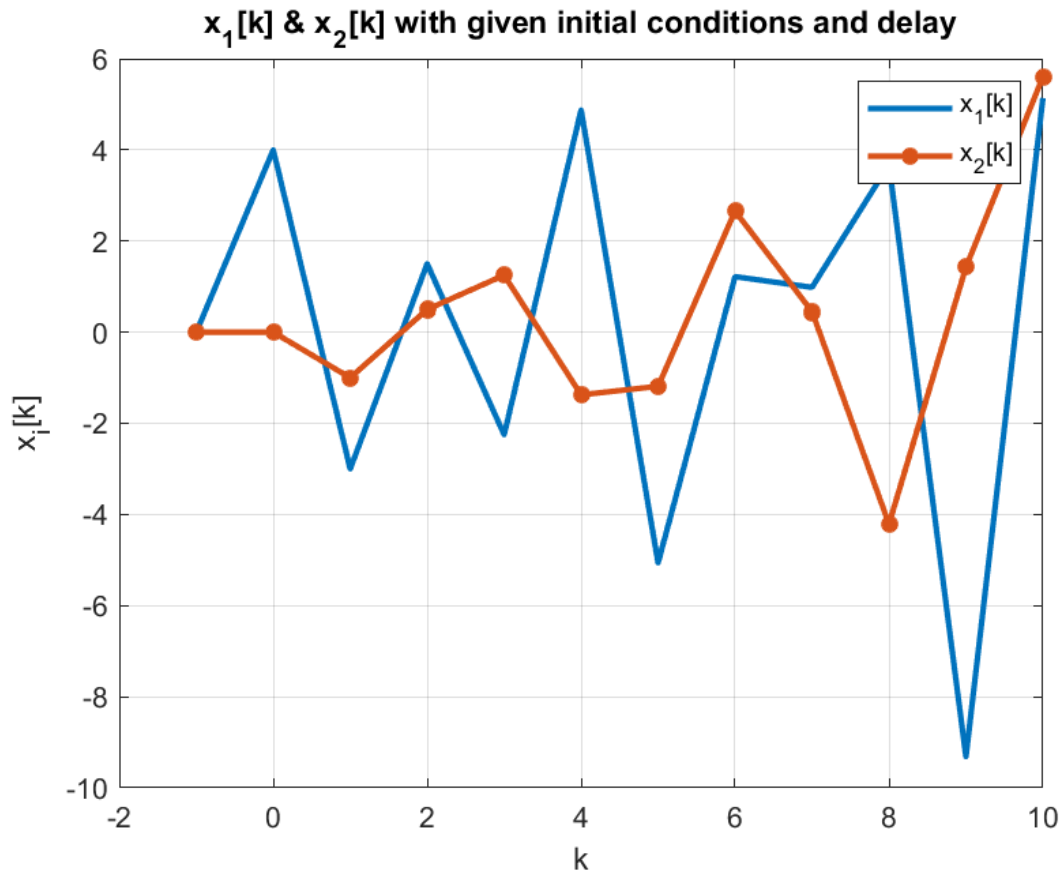


Figure 2: Response of each of the state variables from $k = 0$ to $k = 10$ for Question 5 part b



B Simulation Result For Question 6

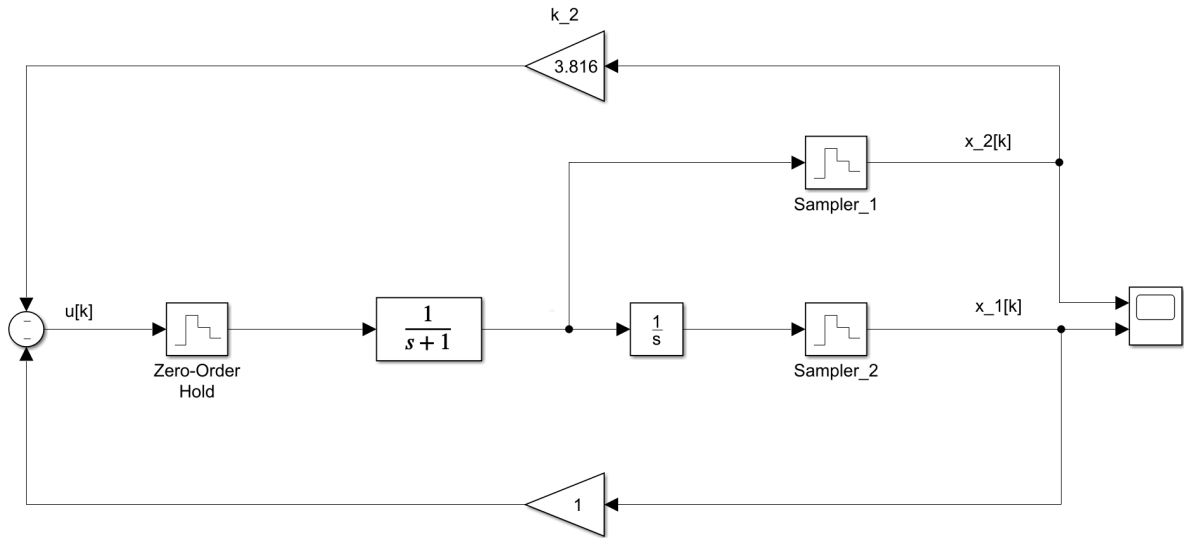


Figure 3: Simulink Diagram to Realize the Given State Feedback Structure

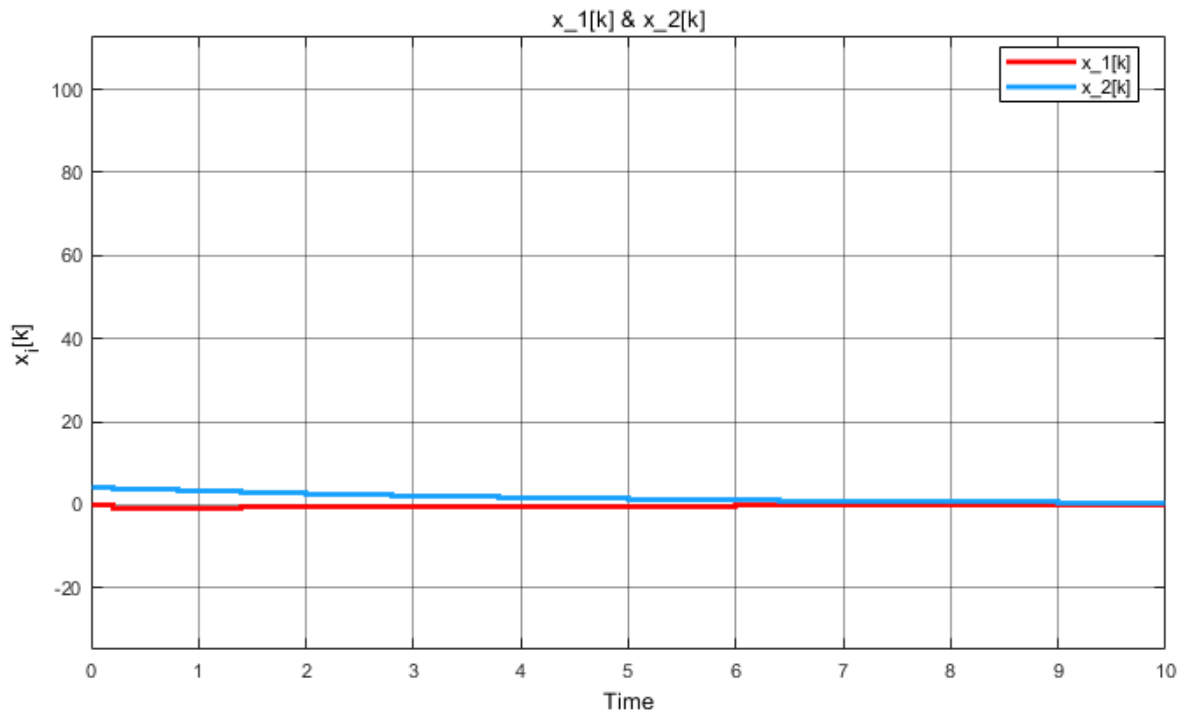


Figure 4: Response of each of the state variables for $x[0] = [0 \ 4]^T$



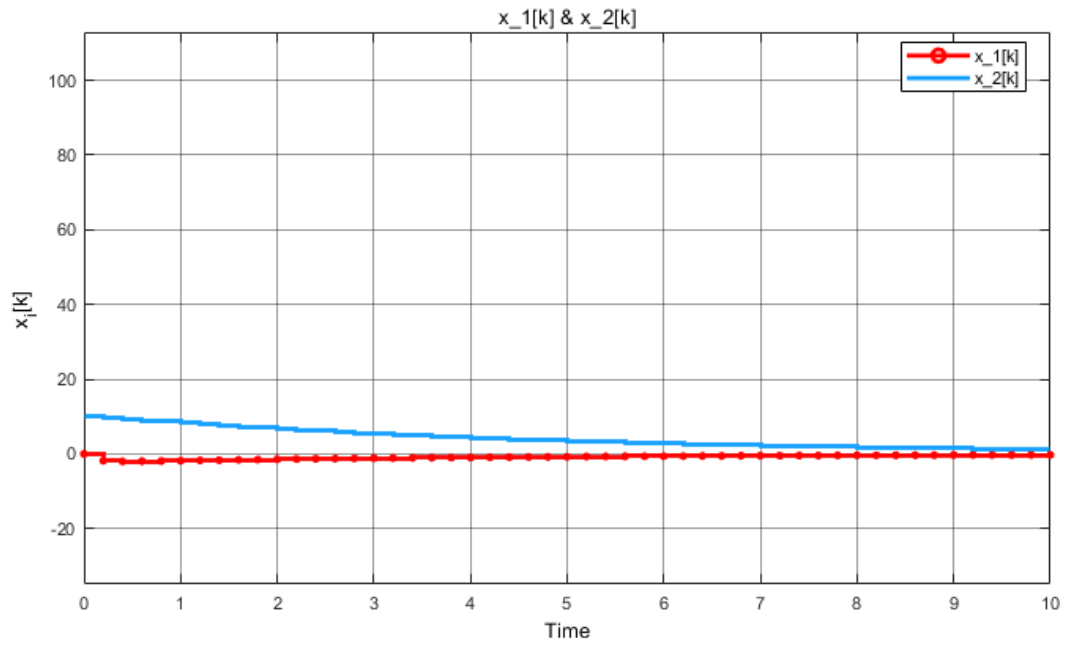


Figure 5: Response of each of the state variables for $x[0] = [0 \ 15]^T$

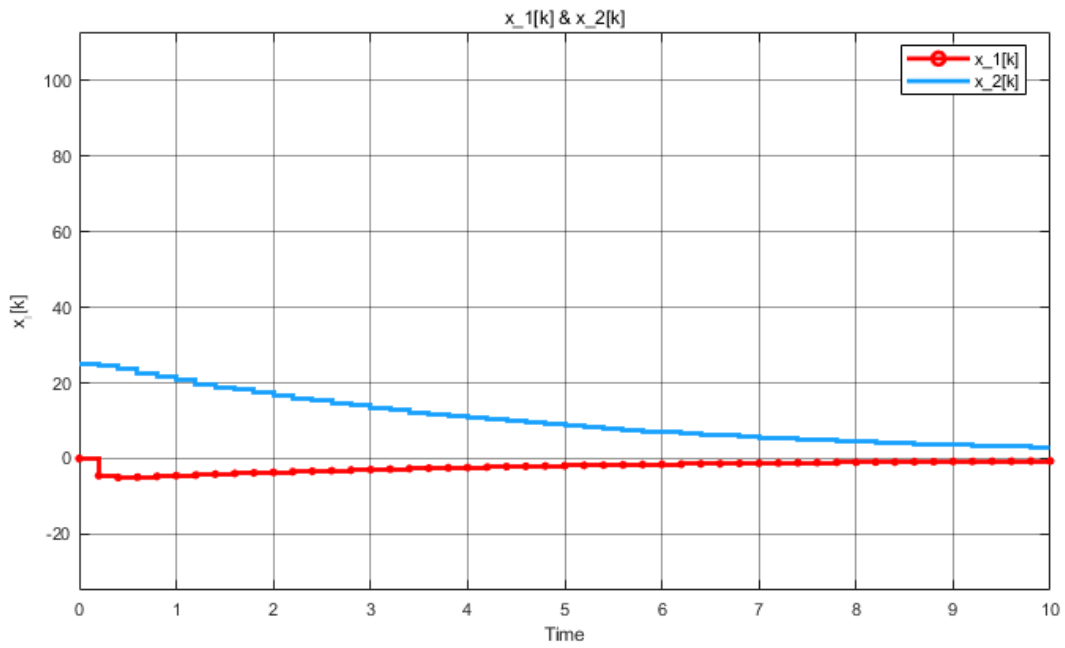


Figure 6: Response of each of the state variables for $x[0] = [0 \ 25]^T$



C Source Code For Question 5

```

1 %% Q5a
2 clc
3 clear
4 x_1(1)=4
5 x_2(1)=0
6 i=2
7 while i<12
8     x_1(i)=-0.5*x_1(i-1)+0.5*x_2(i-1)
9     x_2(i)=-0.5*x_1(i-1)+0.5*x_2(i-1)
10    i=i+1
11 end
12
13 k=0:10
14 plot(k,x_1,'LineWidth',2)
15 hold on
16 plot(k,x_2,'-','LineWidth',2)
17 grid on
18 xlabel('k')
19 ylabel('x_i[k]')
20 title('x_1[k] & x_2[k] with given initial conditions')
21 legend('x_1[k]','x_2[k]')
22 savefig('q5a.fig');
23 fig=openfig('q5a.fig');
24 saveas(fig,'q5a.png');
25 close(fig);
26 hold off;
27
28 %% Q5b
29 clc
30 clear
31 x_1(1)=0
32 x_2(1)=0
33 x_1(2)=4
34 x_2(2)=0
35
36 i=3
37 while i<13
38     x_3(i-1)=-1/4*x_1(i-2)-5/4*x_2(i-2)
39     x_1(i)=-3/4*x_1(i-1)+7/4*x_2(i-1)-x_3(i-1)
40     x_2(i)=-1/4*x_1(i-1)-3/4*x_2(i-1)+x_3(i-1)

```



```
41     i=i+1
42 end
43
44 k=-1:10
45 plot(k,x_1,'LineWidth',2)
46 hold on
47 plot(k,x_2,'-*','LineWidth',2)
48 grid on
49 xlabel('k')
50 ylabel('x_i[k]')
51 title('x_1[k] & x_2[k] with given initial conditions and delay'
52 )
53 legend('x_1[k]','x_2[k]')
54 savefig('q5b.fig');
55 fig=openfig('q5b.fig');
56 saveas(fig,'q5b.png');
57 close(fig);
58 hold off;
```

