

```
1 %% Q3.1.
2
3 clc;
4
5 temp = tf(1,[1 4 20]);
6
7 P1 = 20 * temp;
8 P2 = tf(1600, [1 80]) * temp;
9 P3 = tf([400 400*4], [1 80]) * temp;
10 P4 = tf([400 -400*4], [1 80]) * temp;
11
12 P_s = [P1, P2, P3, P4];
13
14 fig1 = figure ("Name","Root Locus of P_1",'Position',[100✓
350 900 500]);
15 hold all
16 grid on
17 grid minor
18 rlocus(P_s(1));
19 title ("Root Locus of P_1 | " + "Almog Dobrescu✓
214254252");
20 %exportgraphics(fig1, '3.1grap1.png','Resolution',1200);
21
22 fig2 = figure ("Name","Root Locus of P_2",'Position',[250✓
350 900 500]);
23 hold all
24 grid on
25 grid minor
26 rlocus(P_s(2));
27 title ("Root Locus of P_2 | " + "Almog Dobrescu✓
214254252");
28 %exportgraphics(fig2, '3.1grap2.png','Resolution',1200);
29
30 fig3 = figure ("Name","Root Locus of P_3",'Position',[400✓
350 900 500]);
```

```
31 hold all
32 grid on
33 grid minor
34 rlocus(P_s(3));
35 title ("Root Locus of P_3 | " + "Almog Dobrescu✓
214254252");
36 %exportgraphics(fig3, '3.1grap3.png','Resolution',1200);
37
38 fig4 = figure ("Name","Root Locus of P_4",'Position',[550✓
350 900 500]);
39 hold all
40 grid on
41 grid minor
42 rlocus(P_s(4));
43 title ("Root Locus of P_4 | " + "Almog Dobrescu✓
214254252");
44 %exportgraphics(fig4, '3.1grap4.png','Resolution',1200);
45
46 %% Q3.2.
47 k = 1;
48 t = 0:0.01:3.5;
49
50 PP1 = k*P_s(1) / (1+k*P_s(1));
51 PP2 = k*P_s(2) / (1+k*P_s(2));
52 PP3 = k*P_s(3) / (1+k*P_s(3));
53 PP4 = k*P_s(4) / (1+k*P_s(4));
54
55 PP_s = [PP1, PP2, PP3, PP4];
56
57 vectors = {[[],[]],[[],[]],[[],[]],[[],[]]};
58 for i = 1:4
59     [vectors{1,i}{1,1}, vectors{1,i}{1,2}] = step(PP_s(i),✓
t);
60 end
61
```

```
62 colors = {"#0072BD", "#D95319", "#7E2F8E"};
63
64 fig5 = figure ("Name","Plot Response for P_1, P_2, P_3, ✓
P_4 for k = 1",'Position',[100 100 900 700]);
65 tiledlayout(2,1);
66 nexttile
67 hold all
68 grid on
69 grid minor
70
71 for i = 1:3
72     plot(transpose(vectors{1,i}{1,2}), transpose(vectors✓
{1,i}{1,1}), 'LineWidth',1.5,'Color',colors{i})
73 end
74
75 title ("Plot Response for P_1, P_2, P_3 for k = 1 | " + ✓
"Almog Dobrescu 214254252");
76 legend({'P_1','P_2','P_3'},'FontSize',11✓
,'Location','southeast')
77
78 nexttile
79 hold all
80 grid on
81 grid minor
82 plot(transpose(vectors{1,4}{1,2}), transpose(vectors{1,4}✓
{1,1}), 'LineWidth',1.5,'Color',colors{1})
83 title ("Plot Response for P_4 for k = 1 | " + "Almog✓
Dobrescu 214254252");
84 legend({'P_4'},'FontSize',11 , 'Location','northeast')
85 %exportgraphics(fig5, '3.2grap1.png','Resolution',1200);
86
87 %% Q3.3.
88 k = 0.5;
89 t = 0:0.01:5;
90
```

```
91 P4 = tf([400 -400*4], [1 80]) * temp;
92
93 P_s = [P1, P2, P3, P4];
94 PP4 = k*P_s(4) / (1+k*P_s(4));
95 [vectors{1,4}{1,1}, vectors{1,4}{1,2}] = step(PP4, t);
96
97 fig6 = figure ("Name","Plot Response for P_4 for k =✓
0.5",'Position',[250 300 900 500]);
98 hold all
99 grid on
100 grid minor
101 plot(transpose(vectors{1,4}{1,2}), transpose(vectors{1,4}✓
{1,1}), 'LineWidth',1.5,'Color',colors{1})
102 title ("Plot Response for P_4 for k = 0.5 | " + "Almog✓
Dobrescu 214254252");
103 legend({'P_4'}, 'FontSize',11 , 'Location','northeast')
104 %exportgraphics(fig6, '3.3grap1.png','Resolution',1200);
105
```