```matlab
 1 %% Q1.3.
 2 clc;
 3 close all;
 4
 5 k_d = 9.95;
 6 k_p = 9.95*21.0498;
 7 t = 0:0.001:1;
 8
 9 theoretical_contoller = tf([k_d k_p],1);
10 p = tf(1,[1 2])*tf(1,[1 5]);
11 theoretical_h = tf(p*theoretical_contoller/↙
(1+p*theoretical_contoller));
12 [theoretical_y, theoretical_x] = step(tf↙
(p*theoretical_contoller/(1+p*theoretical_contoller)), t);
13
14 epsilon = [1/50, 1/500, 1/5000];
15 epsilon1_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(1)↙
1]);
16 epsilon2_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(2)↙
1]);
17 epsilon3_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(3)↙
1]);
18
19 [epsilon1_y, epsilon1_x] = step(tf(p*epsilon1_contoller/↙
(1+p*epsilon1_contoller)), t);
20 [epsilon2_y, epsilon2_x] = step(tf(p*epsilon2_contoller/↙
(1+p*epsilon2_contoller)), t);
21 [epsilon3_y, epsilon3_x] = step(tf(p*epsilon3_contoller/↙
(1+p*epsilon3_contoller)), t);
22
23 fig1 = figure ("Name","Plot Response of the Closed-Loop↙
System ith the PD Controller",'Position',[100 300 900 500]);
24 hold all
25 grid on
26 grid minor
```

```matlab
27
28 plot(theoretical_x, theoretical_y, '-', 'LineWidth', ↙
3.5,'Color',"#0072BD")
29 plot(epsilon1_x, epsilon1_y, '-', 'LineWidth',2,'Color',"↙
#D95319")
30 plot(epsilon2_x, epsilon2_y, '-.', 'LineWidth',2,'Color',"↙
#EDB120")
31 plot(epsilon3_x, epsilon3_y, ':', 'LineWidth',2,'Color',"↙
#77AC30")
32
33 title ("Plot Response of the Closed-Loop System ith the PD↙
Controller");
34 subtitle("Almog Dobrescu 214254252");
35 legend({'theoretical', sprintf("epsilon = %g", epsilon(1)),↙
sprintf("epsilon = %g", epsilon(2)), sprintf("epsilon = %g",↙
epsilon(3))},'FontSize',11 ,'Location','southeast')
36 %exportgraphics(fig1, '1.3grap1.png','Resolution',1200);
37
38 %% Q1.4.
39 clc;
40
41
42 k_d = 9.95;
43 k_p = 9.95*21.0498;
44 t = 0:0.001:10;
45 epsilon = [1/50, 1/500, 1/5000];
46
47 p = tf(1,[1 2])*tf(1,[1 5]);
48
49 epsilon1_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(1)↙
1]);
50 epsilon2_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(2)↙
1]);
51 epsilon3_contoller = tf(k_p,1) + tf([k_d 0],[epsilon(3)↙
1]);
```

```
52
53 infor_e1 = stepinfo(tf(epsilon1_contoller/↙
(1+p*epsilon1_contoller)));
54 infor_e2 = stepinfo(tf(epsilon2_contoller/↙
(1+p*epsilon2_contoller)));
55 infor_e3 = stepinfo(tf(epsilon3_contoller/↙
(1+p*epsilon3_contoller)));
56
57
```