Nama : Arina Muthmainnah

NIM : 19/442365/PA/19114

```
%deklarasi variabel
s = tf('s')
T = 1
Kp = 1
Kd = 1
num = 1
den = [T T/16 1]
sys = tf(num,den)

%fungsi sistem kontrol dan mencari nilai feedback dengan mengalikan fungsi
kontrol dengan nilai plant
sys_A = tf([Kd Kp],[1])
final_A  = feedback(sys*sys_A,1)

sys_B = tf([3 Kp],[1])
final_B  = feedback(sys*sys_B,1)

sys_C = tf([5 Kp],[1])
final_C  = feedback(sys*sys_C,1)

sys_D = tf([7 Kp],[1])
final_D  = feedback(sys*sys_D,1)

sys_E = tf([9 Kp],[1])
final_E  = feedback(sys*sys_E,1)

%step response
figure(1)
hold all
step(final_A/s)
step(final_B/s)
step(final_C/s)
step(final_D/s)
step(final_E/s)
legend('Step Kd 1','Step Kd 2', 'Step Kd 3', 'Step Kd 4', 'Step Kd 5')

%impulse response
figure(2)
hold all
impulse(final_A)
impulse(final_B)
impulse(final_C)
impulse(final_D)
impulse(final_E)
legend('Impulse Kd 1','Impulse Kd 2', 'Impulse Kd 3', 'Impulse Kd 4',
'Impulse Kd 5')

%ramp impulse
figure(3)
```

```
hold all
step(final_A/s*s)
step(final_B/s*s)
step(final_C/s*s)
step(final_D/s*s)
step(final_E/s*s)
legend('Ramp Kd 1','Ramp Kd 2', 'Ramp Kd 3', 'Ramp Kd 4', 'Ramp Kd 5')

%membandingkan nilai risetime, overshoot, settling time, dan steady set
%error
stepinfo(final_A)
stepinfo(final_B)
stepinfo(final_C)
stepinfo(final_D)
stepinfo(final_E)

[y,u] = step(final_A);
SS_A = abs(1-y(end))

[y1,u1] = step(final_B);
SS_B = abs(1-y1(end))

[y2,u2] = step(final_C);
SS_C = abs(1-y2(end))

[y3,u3] = step(final_D);
SS_D = abs(1-y3(end))

[y4,u4] = step(final_E);
SS_E = abs(1-y4(end))
```

Hasil :

Fungsi Alih

```
sys =

          1
  ------------------
  s^2 + 0.0625 s + 1

Continuous-time transfer function.
```

Nilai Kp = 1, Kd = 1

```
sys_A =

  s + 1

Continuous-time transfer function.


final_A =

        s + 1
  -----------------
  s^2 + 1.062 s + 2

Continuous-time transfer function.
```

Nilai Kp = 1, Kd = 3

```
sys_B =

  3 s + 1

Continuous-time transfer function.


final_B =

       3 s + 1
  -----------------
  s^2 + 3.062 s + 2

Continuous-time transfer function.
```

Nilai Kp = 1, Kd = 5

```
sys_C =

  5 s + 1

Continuous-time transfer function.


final_C =

       5 s + 1
  -----------------
  s^2 + 5.062 s + 2

Continuous-time transfer function.
```

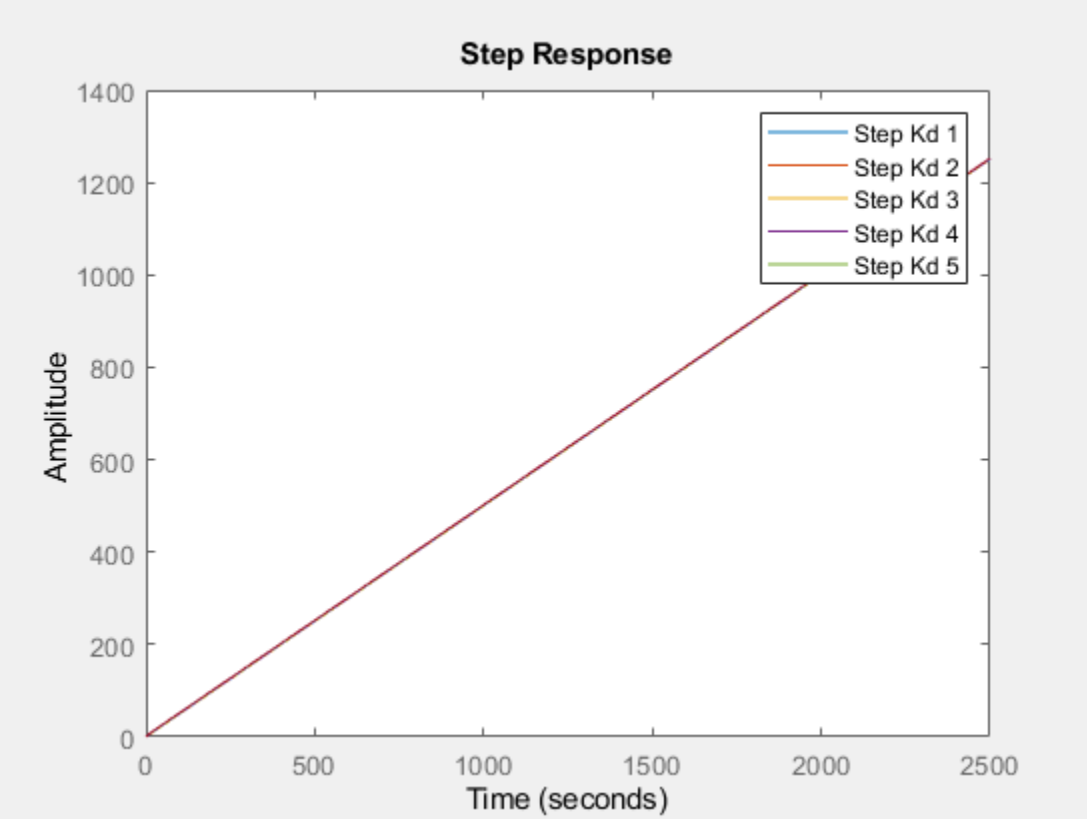
Nilai Kp = 1, Kd = 7

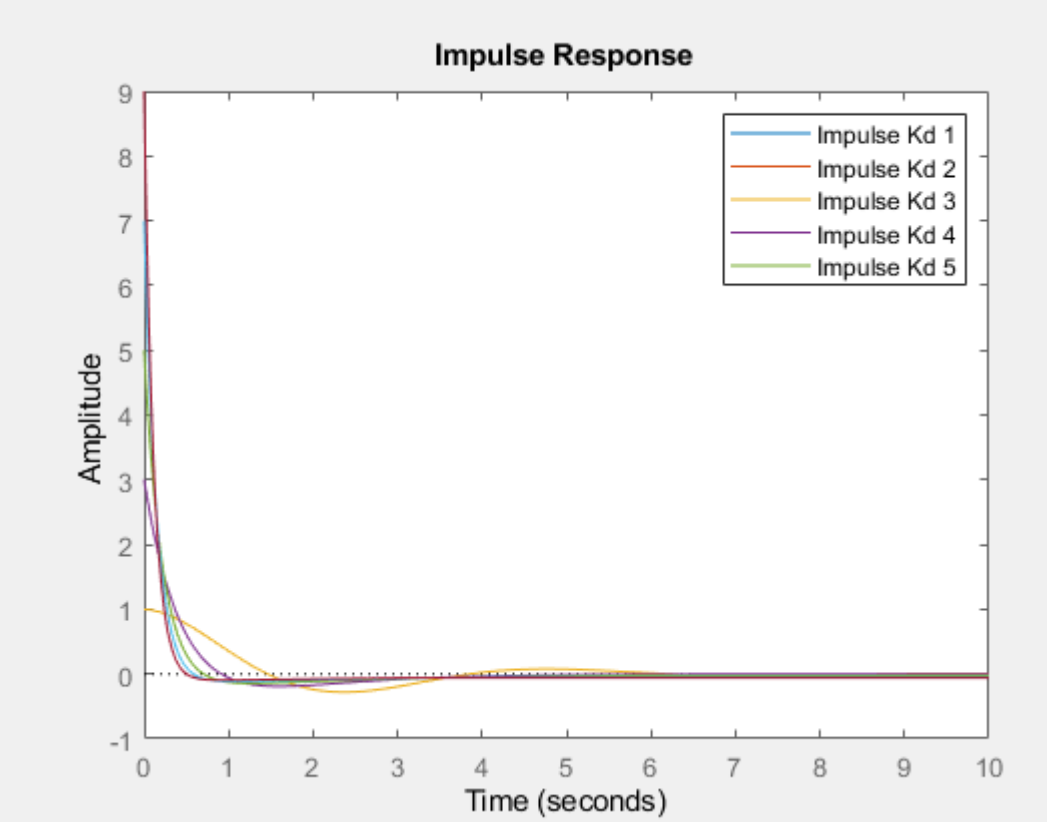
```
sys_D =

  7 s + 1

Continuous-time transfer function.


final_D =

       7 s + 1
  -----------------
  s^2 + 7.062 s + 2

Continuous-time transfer function.
```

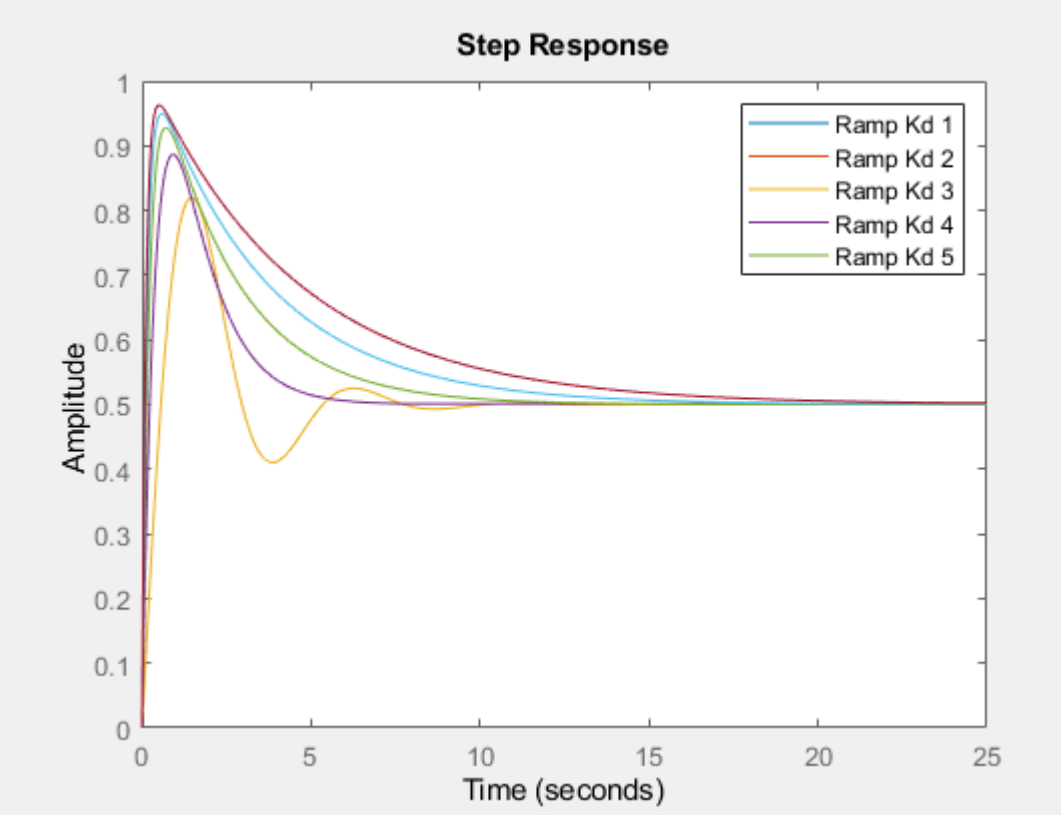
Nilai Kp = 1, Kd = 9

```
sys_E =

  9 s + 1

Continuous-time transfer function.


final_E =

       9 s + 1
  -----------------
  s^2 + 9.062 s + 2

Continuous-time transfer function.
```

Grafik




Impulse Response
Impulse Kd 1
Impulse Kd 2
Impulse Kd 3
Impulse Kd 4
Impulse Kd 5
Amplitude
Time (seconds)
9
8
7
6
5
4
3
2
1
0
-1
0
1
2
3
4
5
6
7
8
9
10


Step Response
Ramp Kd 1
Ramp Kd 2
Ramp Kd 3
Ramp Kd 4
Ramp Kd 5
Amplitude
Time (seconds)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
5
10
15
20
25

Perbandingan rise time, settling time, overshoot, steady set error

Kd	Rise Time	Settling Time	Overshoot	Steady Set Error
1	0.4404	7.2351	64.0571	0.5004
3	0.1777	5.4078	77.3628	0.4964
5	0.1083	9.6269	85.6019	0.4991
7	0.0778	13.6127	89.9807	0.4970
9	0.0607	17.5592	92.5571	0.4954

Link github : https://github.com/arrinaam/Derivative-Control