به نام خدا

نام و نام خانوادگی :

حامد باغستانی

شماره دانشجویی :

۴۰۱۱۶۱۴۳

سیستم های کنترل خطی

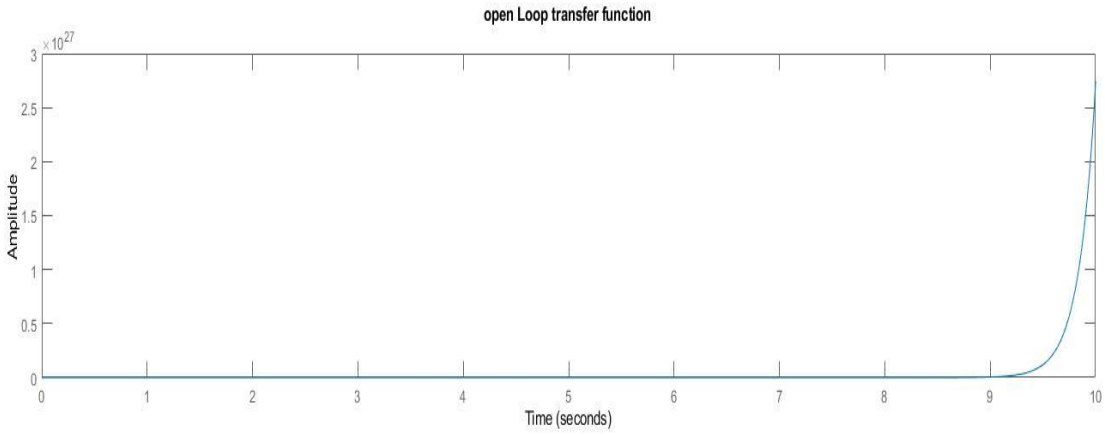
Q1)

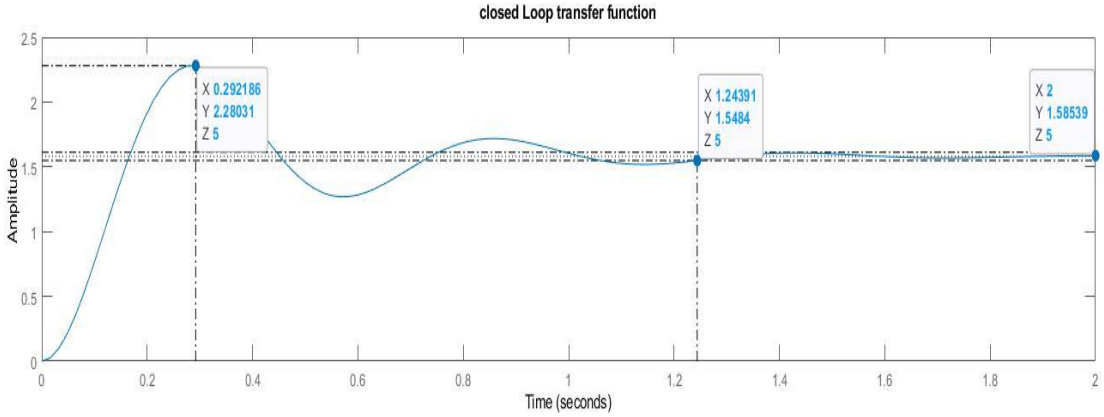
Matlab Code :

```
%Soal 1 Tamrin 2
%Hamed Baghestani (40116143)

clc;
clear all;
close all;

k=1.58;
Wn=11.348;
zeta=0.25;

s=tf('s');

figure('Name','Soal1','NumberTitle','off');
% open Loop transfer function
subplot(2,1,1);
Ls= (k*Wn^2)/(s^2+2*zeta*Wn*s+(1-k)*Wn^2);
step(Ls);
title('open Loop transfer function');
```

```
%closed loop transfer function
subplot(2,1,2);
Ts= (k*Wn^2)/(s^2+2*zeta*Wn*s+Wn^2);
step(Ts);
title('closed Loop transfer function');
```

Output or Plot :





Q2)

Matlab Code :

```
%Soal 2 Tamrin 2
%HamedBaghestani (40116143)
clc;
clear all;
close all;
s=tf('s');

LS=0.4/(s+0.4);
TS=0.4/(s+0.8);

figure('Name','Soal2','NumberTitle','off');
hold on;
step(LS,25);
step(TS,25);
legend;

stepinfo(LS)
stepinfo(TS)
damp(LS)
damp(TS)
```

Output or Plot :

Datas of Open Loop System (Ls) :

RiseTime: 5.4925

TransientTime: 9.7802

SettlingTime: 9.7802

SettlingMin: 0.9045

SettlingMax: 1.0000

Overshoot: 0

Undershoot: 0

Peak: 1.0000

PeakTime: 26.3646

Pole	£	Frequency	Time Constant
-4.00e-01	1.00e+00	4.00e-01	2.50e+00

Datas of Closed Loop System (Ts) :

RiseTime: 2.7463

TransientTime: 4.8901

SettlingTime: 4.8901

SettlingMin: 0.4523

SettlingMax: 0.5000

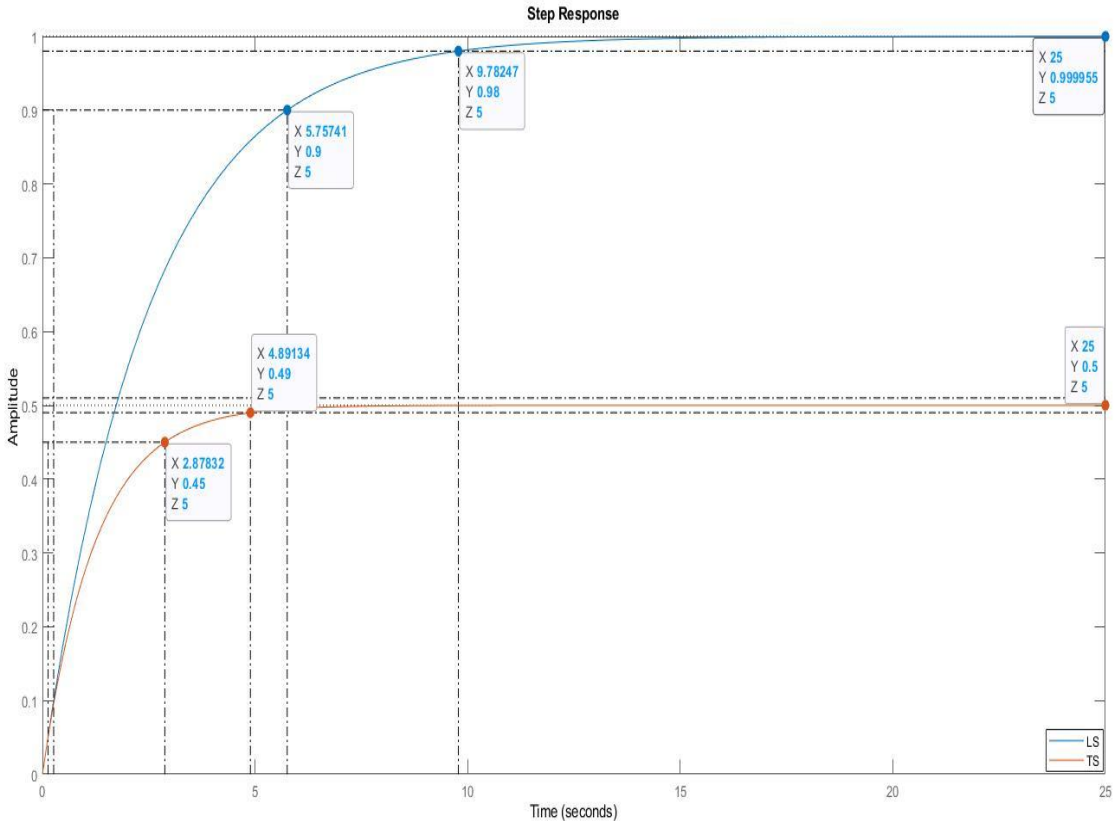
Overshoot: 0

Undershoot: 0

Peak: 0.5000

PeakTime: 13.1823

Pole	£	Frequency	Time Constant
-8.00e-01	1.00e+00	8.00e-01	1.25e+00



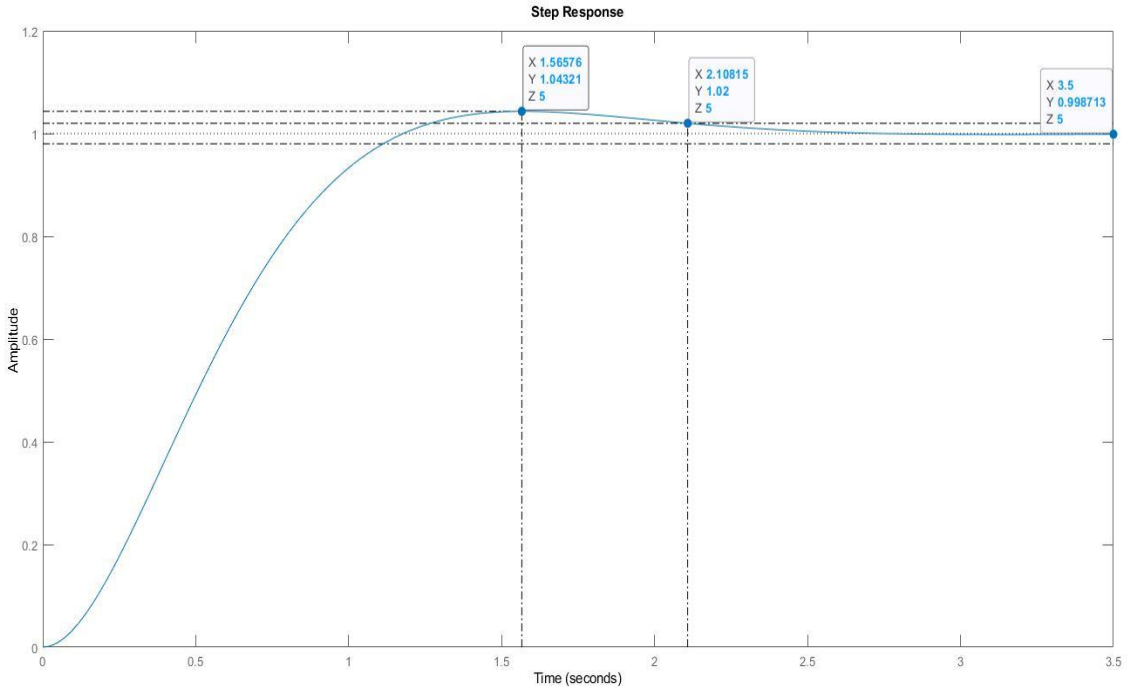
Q3)

Matlab Code :

```
%Soal 3 Tamrin 2
%HamedBaghestani (40116143)
clc;
clear all;
close all;
s=tf('s');

Ts=8/(s^2+4*s+8);
Ts

figure('Name','Soal3','NumberTitle','off');
step(Ts);
```

Outpot or Plot :

```
Ts =

          8
  -------------
  s^2 + 4 s + 8
```



- As we discussed in the handwritten solution, if we want to have an exact answer according to what the question asked; we should equate K with 8.4 . then we have below plot :