

Lista 3 – Laboratório de Sistemas Dinâmicos – 22B

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Questão 1:

```
%Lista 3 - Pedro Henrique Guimaraes Carvalho / João Souza Santiago  
%Questao 1
```

```
clear;  
clc;  
close all;
```

```
s = tf('s');  
p = (s^2 + 2*s + 1);  
q = (s + 1);
```

```
%a)
```

```
a = p*q;  
disp(a);
```

```
%b)
```

```
num = [1 1];  
den = [1 2 1];  
g = tf(num,den);  
zeros = zero(g);  
polos = pole(g);  
disp("Polos: ");  
disp(polos);  
disp("Zeros: ");  
disp(zeros);
```

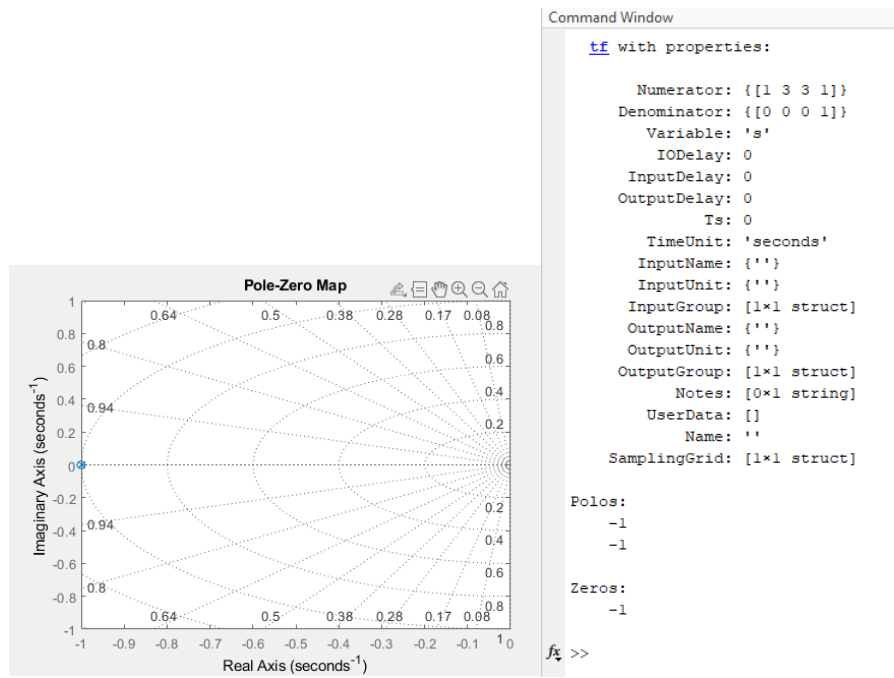
```
%c)
```

```
frsp = evalfr (p, -1);
```

```
%d)
```

```
pzmap (g);  
grid on;
```

Respostas:



Questão 2:

%Questao 2

```
clear;
```

```
close all;
```

```
clc;
```

%a)

```
C = tf([0,1] , [1 1]);
```

```
G = tf([0,1] , [1 3]);
```

```
T = series(C,G);
```

```
printsys(1,[1 4 3], 's');
```

```
subplot(2,2,1);
```

```
step(T);
```

%b)

```
t = 0:0.1:10;
```

```
subplot(2,2,2);
```

```
step(T,t);
```

%c)

```
subplot(2,2,3);
```

```
step(C,t);
```

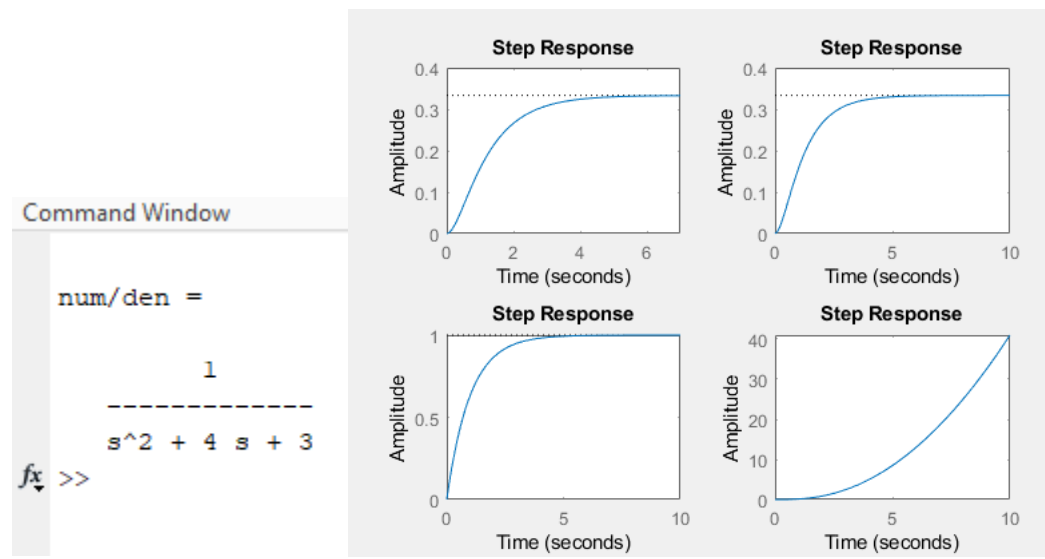
```
subplot(2,2,4);
```

```
step(G,t);
```

```
%d)
```

```
Z = tf([0,0,1],[1,0,0]);  
J = series(C,Z);  
step(J,t);
```

Respostas:



Questao 3:

```
%Questao 3
```

```
clear;  
clc;  
close all;
```

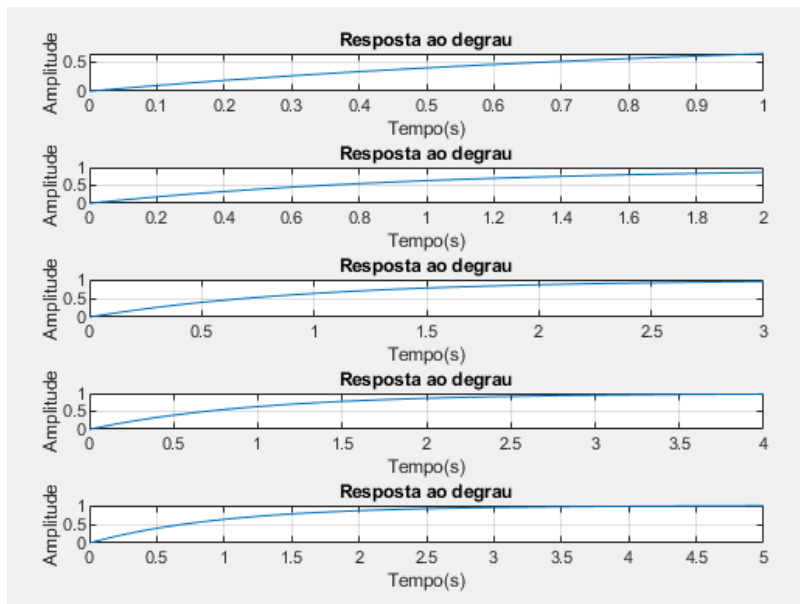
```
[Z,P,K] = tf2zp(1,[1 1]);  
Cs = tf(1,[1 1]);  
subplot(5,1,1);  
t1 = [0:0.1:1];  
y1= step(Cs,t1);%T  
plot(t1,y1);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao  
degrau'); grid('on');  
subplot(5,1,2);  
t2 = [0:0.1:2]; %2T  
y2= step(Cs,t2);  
plot(t2,y2);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao  
degrau'); grid('on');  
subplot(5,1,3);  
t3 = [0:0.1:3]; %3T  
y3= step(Cs,t3);  
plot(t3,y3);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao  
degrau'); grid('on');  
subplot(5,1,4);  
t4 = [0:0.1:4]; %4T
```

```

y4= step(Cs,t4);
plot(t4,y4);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao
degrau'); grid('on');
subplot(5,1,5);
t5 = [0:0.1:5]; %5T
y5= step(Cs,t5);
plot(t5,y5);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao
degrau'); grid('on');

```

Respostas:



```

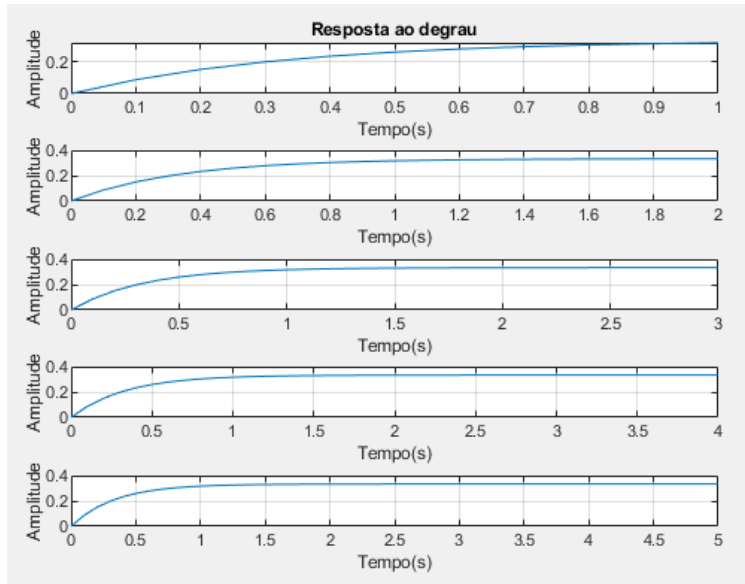
clear;
clc;
close all;

[Z,P,K] = tf2zp(1,[1 3]);
subplot(5,1,1);
t1 = [0:0.1:1];
y1= step(Gs,t1);%T
plot(t1,y1);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao
degrau'); grid('on');
subplot(5,1,2);
t2 = [0:0.1:2]; %2T
y2= step(Gs,t2);
plot(t2,y2);xlabel('Tempo(s)');ylabel('Amplitude'); grid('on');
subplot(5,1,3);
t3 = [0:0.1:3]; %3T
y3= step(Gs,t3);
plot(t3,y3);xlabel('Tempo(s)');ylabel('Amplitude');; grid('on');
subplot(5,1,4);
t4 = [0:0.1:4]; %4T
y4= step(Gs,t4);
plot(t4,y4);xlabel('Tempo(s)');ylabel('Amplitude'); grid('on');
subplot(5,1,5);

```

```
t5 = [0:0.1:5]; %5T
y5= step(Gs,t5);
plot(t5,y5);xlabel('Tempo(s)');ylabel('Amplitude'); grid('on');
```

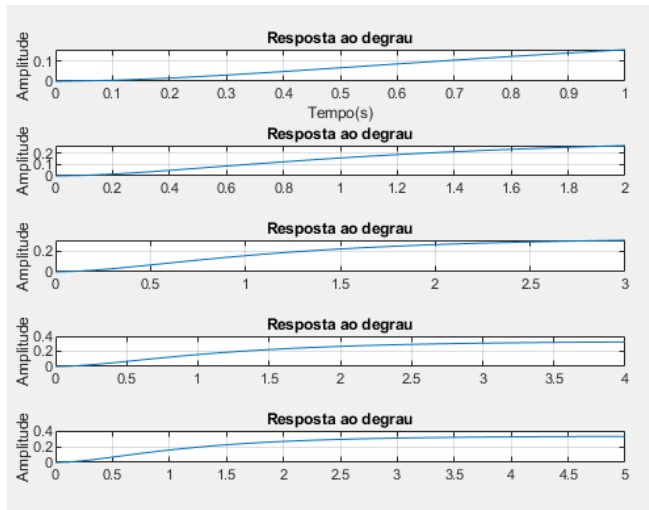
Respostas:



```
clc;
close all;
clear;

Ts = tf(1,[1 4 3]);
subplot(5,1,1);
t1 = [0:0.1:1];
y1= step(Ts,t1);%T
plot(t1,y1);xlabel('Tempo(s)');ylabel('Amplitude');title('Resposta ao degrau'); grid('on');
subplot(5,1,2);
t2 = [0:0.1:2]; %2T
y2= step(Ts,t2);
plot(t2,y2);ylabel('Amplitude');title('Resposta ao degrau'); grid('on');
subplot(5,1,3);
t3 = [0:0.1:3]; %3T
y3= step(Ts,t3);
plot(t3,y3);ylabel('Amplitude');title('Resposta ao degrau'); grid('on');
subplot(5,1,4);
t4 = [0:0.1:4]; %4T
y4= step(Ts,t4);
plot(t4,y4);ylabel('Amplitude');title('Resposta ao degrau'); grid('on');
subplot(5,1,5);
t5 = [0:0.1:5]; %5T
y5= step(Ts,t5);
plot(t5,y5);ylabel('Amplitude');title('Resposta ao degrau'); grid('on');
```

Respostas:



Questao 4:

```
%Questao 4
```

```
clear;
clc;
close all;
```

```
%a)
```

```
D = tf([0,1],[1,0]);
U = tf([0,1],[1,0]);
H_d = tf([0,2.5],[1,0.5]);
H_u = tf([0,2],[1,0.5]);
Ys = - series(D,H_d) + series(U,H_u)
```

```
%b)
```

```
D = tf([0,0],[1,0]);
U = tf([0,1],[5,0]);
H_d = tf([0,2.5],[1,0.5]);
H_u = tf([0,2],[1,0.5]);
Ys = - series(D,H_d) + series(U,H_u)
step(Ys);
```

```
%c)
```

```
D = tf([0,1],[1,0]);
U = tf([0,1],[5,0]);
H_d = tf([0,2.5],[1,0.5]);
H_u = tf([0,2],[1,0.5]);
Ys = - series(D,H_d) + series(U,H_u)
step(Ys);
```

```
%d)
```

```

D = tf([0,1],[1,0]);
U = tf([0,1],[5,0]);
H_d = tf([0,2.5],[1,0.5]);
H_u = tf([0,2],[1,0.5]);
ds = tf([0,1],[1,-120]);
Ys = - series(series(D,H_d),ds) + series(U,H_u)
step(Ys);

```

Respostas:

Command Window

```

Ys =

      -0.5 s^2 - 0.25 s
      -----
      s^4 + s^3 + 0.25 s^2

Continuous-time transfer function.

Ys =

      2
      -----
      5 s^2 + 2.5 s

Continuous-time transfer function.

Ys =

      -10.5 s^2 - 5.25 s
      -----
      5 s^4 + 5 s^3 + 1.25 s^2

Continuous-time transfer function.

Ys =

      2 s^3 - 251.5 s^2 - 126.3 s
      -----
      5 s^5 - 595 s^4 - 598.8 s^3 - 150 s^2

Continuous-time transfer function.

```

f1 >>

