Daniel Galbes Bassanezi 22/04/2015

Laboratório de Controle 2

1)

```
'(1)' % Display label.
'How are you?' % Display string.
-3.96 % Display scalar number -3.96.
-4+7i % Display complex number -4+7i.
-5-6j % Display complex number -5-6j.
(-4+7i)+(-5-6i) % Add two complex numbers and display sum.
(-4+7j)*(-5-6j) % Multiply two complex numbers and display product.
M=5 % Assign 5 to M and display.
N=6 % Assign 6 to N and display.
M+N
M*N
```

Resultados:

ans = (1)

ans = How are you?

ans = -3.9600

ans = -4.0000 + 7.0000i

ans = -5.0000 - 6.0000i

ans = -9.0000 + 1.0000i

ans = 62.0000 -11.0000i

M = 5

N = 6

ans = 11

ans = 30

2)

```
% (10s^2+40s+60)/(s^3+4s^2+5s+7)
numftf=[10 40 60];
denftf=[1 4 5 7];
[z,p,k] = tf2zp(numftf,denftf);
[b,a]   = zp2tf(z,p,k);
```

Resultados:

z =

-2.0000 + 1.4142i

-2.0000 - 1.4142i

p =

-3.1163 + 0.0000i

-0.4418 + 1.4321i

-0.4418 - 1.4321i

k = 10

b = 0 10 40 60

a = 1.0000 4.0000 5.0000 7.0000

3)

```
Fzpk1 = zpk([-2 -4],[0 -3 -5],10)
Ftf1  = tf(Fzpk1)
Fzpk2 = zpk(Ftf1)
```

Resultados:

```
Fzpk1 =

  10 (s+2) (s+4)
  --------------
  s (s+3) (s+5)

Continuous-time zero/pole/gain model.

Ftf1 =

  10 s^2 + 60 s + 80
  ------------------
  s^3 + 8 s^2 + 15 s

Continuous-time transfer function.

Fzpk2 =

  10 (s+4) (s+2)
  --------------
  s (s+5) (s+3)

Continuous-time zero/pole/gain model.
```

4)

```
numf = 150*[1 2 7]; % Store 150(s^2+2s+7) in numf and % display.
denf = [1 5 4 0]; % Store s(s+1)(s+4) in denf and % display.
F  = tf(numf,denf)
G  = zpk(F)
s  = tf('s')
F2 = tf(numf,denf)
s  = zpk('s')
F3 = tf(numf,denf)
```

Resultados:

```
F =

  150 s^2 + 300 s + 1050
  ----------------------
    s^3 + 5 s^2 + 4 s

Continuous-time transfer function.

G =

  150 (s^2 + 2s + 7)
  ------------------
    s (s+4) (s+1)

Continuous-time zero/pole/gain model.

F2 =

  150 s^2 + 300 s + 1050
  ----------------------
    s^3 + 5 s^2 + 4 s

Continuous-time transfer function.

F3 =

  150 s^2 + 300 s + 1050
  ----------------------
    s^3 + 5 s^2 + 4 s

Continuous-time transfer function.
```

5)

```
syms s % Construct symbolic object for Laplace variable 's'.
F=2/[(s+1)*(s+2)^2];
iF = ilaplace(F);
pretty(iF)
```

Resultados:

F =

2/((s + 1)*(s + 2)^2)

iF =

2*exp(-t) - 2*exp(-2*t) - 2*t*exp(-2*t)

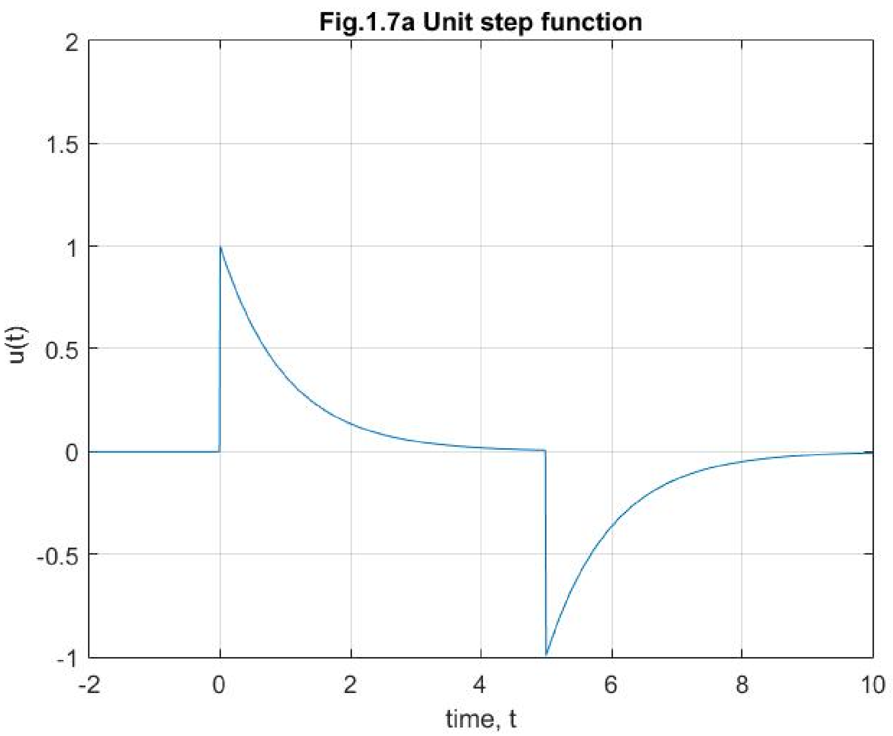
pretty(iF) =

2 exp(-t) - exp(-2 t) 2 - t exp(-2 t) 2

6)

```
%declarar variaveis
io=1
G=1
H=1
t= -2:0.01:10; %vetor de tempo, eixo x

q=size(t); %mede dimensões do vetor t
r=size(t); %mede dimensões do vetor t
f=zeros(q(1),q(2));  %seta f um vetor de zeros do tamanho de q ou t
ff=zeros(r(1),r(2)); %seta ff um vetor de zeros de mesmo tamanho
q=size(t(201:1201)); %modifica tamanho q para 1000
r=size(t(701:1201)); %modifica tamanho r para 500

f(201:1201)=ones(q(1),q(2)); %seta os ultimos 1000 pontos de f  para 1
ff(701:1201)=ones(r(1),r(2));%seta os ultimos 500  pontos de ff para 1

rr=io*(exp(-(G/H)*t).*f-(exp(-(G/H)*(t-5))).*ff);
%calcula uma expressao envolvendo f e ff que são pulsos começando em
200 e 700 e acabando em 1200

plot(t,rr) %plota a expressao calculada
title('Fig.1.7a Unit step function'); %título da figura
axis([-2,10,-1,2]); % limita eixos x e y
xlabel('time, t');  %legenda eixo x
ylabel(' u(t)');    %legenda eixo y
grid;   %grade
```

Resultados:



7)

```
% making use of MATLAB's Symbolic Math Toolbox for simplicity and
readability.
syms s

G=54*(s+27)*(s^3+52*s^2+37*s+73)/(s*(s^4+872*s^3+437*s^2+89*s+65)*(s^2
+79*s+36));

[numg,deng]=numden(G)
numpoly = sym2poly(numg)
denpoly = sym2poly(deng)
pretty(G)
```

Resultados:

```
numg =

54*(s + 27)*(s^3 + 52*s^2 + 37*s + 73)

deng =

s*(s^2 + 79*s + 36)*(s^4 + 872*s^3 + 437*s^2 + 89*s + 65)

numpoly =

      54      4266      77814      57888     106434

denpoly =

  Columns 1 through 5

       1       951      69361      66004      22828

  Columns 6 through 8

    8339      2340         0

pretty(G) =
                       3      2
      (54 s + 1458) (s  + 52 s  + 37 s + 73)
------------------------------------------------------
    2               4       3       2
s (s  + 79 s + 36) (s  + 872 s  + 437 s  + 89 s + 65)
```