Taller 2 Control

Integrantes

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1. Formar los grupos de trabajo de laboratorio

2. Comprobar la matriz inversa que se hizo en clase

```
clear
format rat
A = [1 3 5; 2 1 3; 4 3 1]
```

```
A =
     1     3     5
     2     1     3
     4     3     1
```

```
InversaA = inv(A)
```

```
InversaA =
    -1/4     3/8     1/8
     5/16  -19/32     7/32
     1/16     9/32   -5/32
```

3. Identificar polos y ceros de

a.

```
syms s
Gs1 = (10*(s+2))/(s^2*(s+1)*(s+10))
```

```
Gs1 =
```

$$\frac{10\,s+20}{s^2\,(s+1)\,(s+10)}$$

```
Ps1 = [10 20]
```

```
Ps1 =
    10    20
```

```
Qs1 = [1 11 10 0 0]
```

```
Qs1 =
     1    11    10     0     0
```

```
[z1,p1,k1] = tf2zp(Ps1,Qs1)
```

```
z1 =
    -2
p1 =
     0
     0
   -10
    -1
```

```
k1 =
      10
```

Con esto tenemos que el polo es -2 y los ceros son 0, -1 y -10

b.

```
Gs2 = (10*s*(s+1))/((s+2)*(s^2+3*s+2))
```

```
Gs2 =
```

$$\frac{10\,s\,(s+1)}{(s+2)\,(s^2+3\,s+2)}$$

```
Ps2 = [10 10 0]
```

```
Ps2 =
      10            10             0
```

```
Qs2 = [1 5 8 4]
```

```
Qs2 =
       1             5             8             4
```

```
[z2,p2,k2] = tf2zp(Ps2,Qs2)
```

```
z2 =
       0
      -1
p2 =
      -2
      -2
      -1
k2 =
      10
```

En p2 y z2 se ven los polos y ceros respectivamente

c.

```
Gs3 = (10*(s+2))/(s*(s^6+2*s+2))
```

```
Gs3 =
```

$$\frac{10\,s+20}{s\,(s^6+2\,s+2)}$$

```
Ps3 = [10 20]
```

```
Ps3 =
      10            20
```

```
Qs3 = [1 0 0 0 0 2 2 0]
```

```
Qs3 =
       1             0             0             0             0             2             2             0
```

```
[z3,p3,k3] = tf2zp(Ps3,Qs3)
```

```
z3 =
```

```
      -2
p3 =
       0        +    0i
    1009/942    +   44/63i
    1009/942    -   44/63i
    -208/1087   +  422/359i
    -208/1087   -  422/359i
   -1544/1755   +  338/1137i
   -1544/1755   -  338/1137i
k3 =
      10
```

En p3 y z3 se ven el polo y los ceros respectivamente

```
syms g t U_s;
```

4. Encontrar la transformada de Laplace de las siguientes ecuaciones.

```
eq_a=g==5*t*exp(-5*t)*U_s
```

eq_a = $g = 5\,U_s\,t\,\mathrm{e}^{-5\,t}$

```
eq_b=g==(t*sin(2*t)+exp(2*t))*U_s
```

eq_b = $g = U_s\,(\mathrm{e}^{2\,t} + t\,\sin(2\,t))$

```
eq_c=g==2*exp(-2*t)*sin(2*t)*U_s
```

eq_c = $g = 2\,U_s\,\sin(2\,t)\,\mathrm{e}^{-2\,t}$

```
eq_d=g==(sin(2*t)*cos(2*t))*U_s
```

eq_d = $g = U_s\cos(2\,t)\,\sin(2\,t)$

Solucion

```
lap_a=laplace(eq_a)
```

lap_a =

$$\frac{g}{s} = \frac{5\,U_s}{(s+5)^2}$$

```
lap_b=laplace(eq_b)
```

lap_b =

$$\frac{g}{s} = U_s\left(\frac{1}{s-2} + \frac{4\,s}{(s^2+4)^2}\right)$$

```
lap_c=laplace(eq_c)
```

lap_c =

$$\frac{g}{s} = \frac{4\,U_s}{(s+2)^2+4}$$

```
lap_d=laplace(eq_d)
```

```
lap_d =
```

$$\frac{g}{s} = \frac{2\,U_s}{s^2 + 16}$$

5. Resuelva la ecuacion diferencial

```
syms t s F
eq = s^2*F + 5*s*F + 4*F == 1/(s + 2);
disp(eq)
```

$$F\,s^2 + 5\,F\,s + 4\,F = \frac{1}{s+2}$$

```
sol = solve(eq, F);
disp(sol)
```

$$\frac{1}{(s+2)\,(s^2+5\,s+4)}$$

```
f_t = ilaplace(sol, s, t);
disp(f_t)
```

$$\frac{\mathrm{e}^{-t}}{3} - \frac{\mathrm{e}^{-2\,t}}{2} + \frac{\mathrm{e}^{-4\,t}}{6}$$

```
syms G S
```

6. Encuentre la Transformada Inversa de Laplace de las siguientes ecuaciones

```
eq_a=G==1/(S*(S+1)*(S+3))
```

```
eq_a =
```

$$G = \frac{1}{S\,(S+1)\,(S+3)}$$

```
eq_b=G==(10*S*(S+1))/((S+2)*(S^2+3*S+2))
```

```
eq_b =
```

$$G = \frac{10\,S\,(S+1)}{(S+2)\,(S^2+3\,S+2)}$$

```
eq_c=G==(10*(S+2))/(S*(S^2+2*S+2))
```

```
eq_c =
```

$$G = \frac{10\,S+20}{S\,(S^2+2\,S+2)}$$

```
eq_f=G==(2*(S^2+S+1))/(S*(S+1.5)*(S^2+5*S+5))
```

```
eq_f =
```

$$G = \frac{2S^2 + 2S + 2}{S\left(S + \frac{3}{2}\right)(S^2 + 5S + 5)}$$

Solucion

```
ILap_a=ilaplace(eq_a)
```

```
ILap_a =
```

$$G\,\delta(t) = \frac{e^{-3t}}{6} - \frac{e^{-t}}{2} + \frac{1}{3}$$

```
ILap_b=ilaplace(eq_b)
```

```
ILap_b =
```

$$G\,\delta(t) = 10\,e^{-2t} - 20\,t\,e^{-2t}$$

```
ILap_c=ilaplace(eq_c)
```

```
ILap_c =
```

$$G\,\delta(t) = 10 - 10\,e^{-t}\cos(t)$$

```
ILap_f=ilaplace(eq_f)
```

```
ILap_f =
```

$$G\,\delta(t) = \frac{28\,e^{-\frac{3t}{2}}}{3} - \frac{48\,e^{-\frac{5t}{2}}\left(\cosh\left(\frac{\sqrt{5}\,t}{2}\right) + \frac{\sqrt{5}\,\sinh\left(\frac{\sqrt{5}\,t}{2}\right)}{3}\right)}{5} + \frac{4}{15}$$

7. Encontrar las matriz inversa

```
A=[2 5,
    10 -1]
Inv_A = inv(A)
```

```
A =
      2             5
     10            -1
Inv_A =
      1/52          5/52
      5/26         -1/26
```

```
A=[3 0 -1,
    -2 1 2,
    0 1 -1]
Inv_A = inv(A)
```

```
A =
      3             0            -1
     -2             1             2
      0             1            -1
Inv_A =
```

```
        3/7            1/7           -1/7
        2/7            3/7            4/7
        2/7            3/7           -3/7
```

8. Expresar en conjunto de ecuaciones algebraicas de forma matricial.

C1.

x_1+x_2-x_3=1

-x_1+3x_2-x_3=1

3x_1-5x_2-2x_3=0

```
A=[1 1 -1,
    -1 3 -1,
    3 -5 -2]
B=[1,1,0]
```

```
A =
       1             1            -1
      -1             3            -1
       3            -5            -2
B =
       1             1             0
```

C2.

x_1+x_2-x_3=1

-x_1+3x_2-x_3=1

2x_1-2x_2=0

```
A=[1 1 -1,
    -1 3 -1,
    2 -2 0]
B=[1,1,0]
```

```
A =
       1             1            -1
      -1             3            -1
       2            -2             0
B =
       1             1             0
```

```
export("Taller_2.mlx")
```

```
Error using export
Unable to overwrite existing file. Check write permission or whether the file is open in another application.
```