



# **UNIVERSIDAD FIDELITAS**

**Escuela de Ingeniería Eléctrica**

**Control automático**

Tarea#8

Realizado por:

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Profesor:

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**Parte en matlab:**

```
>> A=tf([0 0 1],[1 10 24])
```

A =

1

-----

$s^2 + 10s + 24$

Continuous-time transfer function.

```
>> W=feedback(A,1)
```

W =

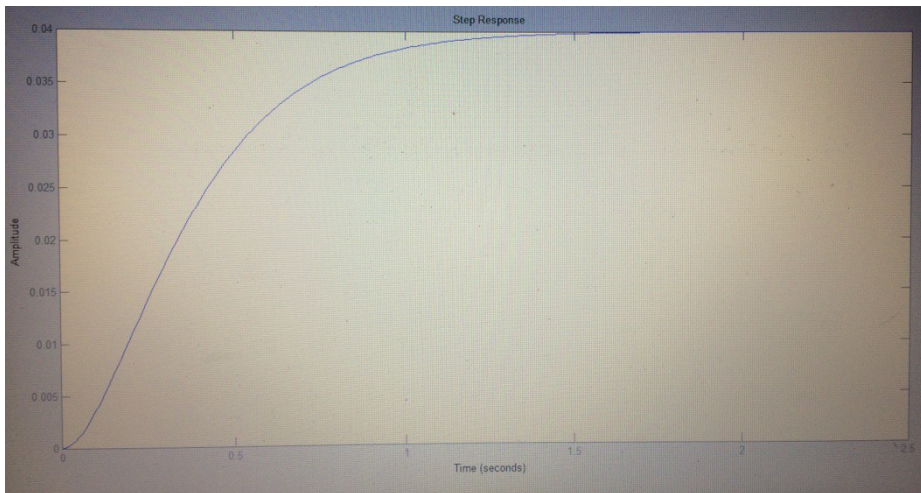
1

-----

$s^2 + 10s + 25$

Continuous-time transfer function.

```
>> step(W)
```



```
>> E=feedback(1,W)
```

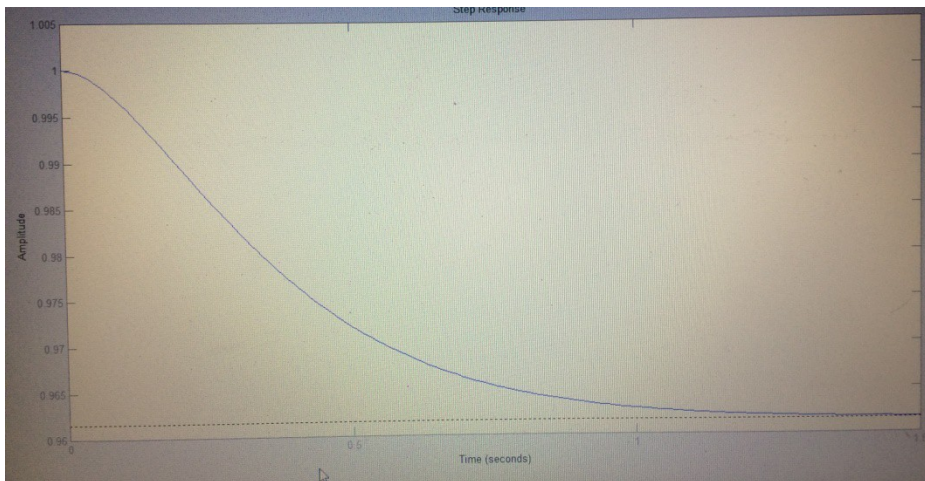
E =

$$\frac{s^2 + 10s + 25}{s^2 + 10s + 26}$$

$$\frac{s^2 + 10s + 25}{s^2 + 10s + 26}$$

Continuous-time transfer function.

>> step(E)



>> P=tf([1 1.25],[1 1])

P =

$$\frac{s + 1.25}{s + 1}$$

$$\frac{s + 1.25}{s + 1}$$

Continuous-time transfer function.

>> S=series(A,P)

S =

$$\frac{s + 1.25}{s^3 + 11s^2 + 34s + 24}$$

$$\frac{s + 1.25}{s^3 + 11s^2 + 34s + 24}$$

Continuous-time transfer function.

```
>> F=feedback(S,1)
```

F =

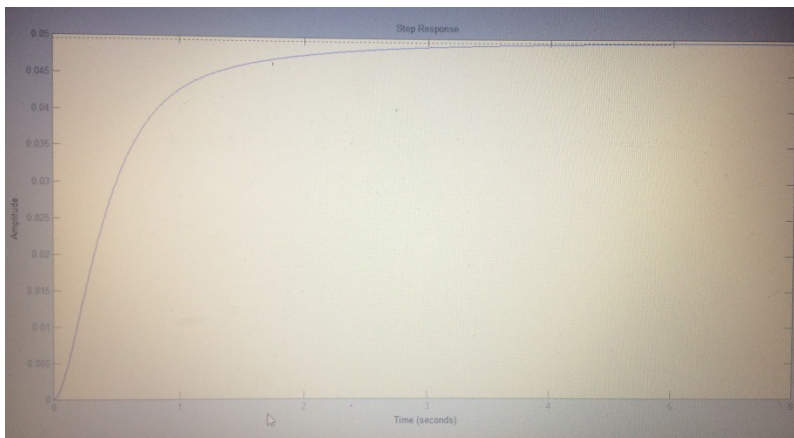
$$s + 1.25$$

-----

$$s^3 + 11 s^2 + 35 s + 25.25$$

Continuous-time transfer function.

```
>> step(F)
```



```
>> M=feedback(1,S)
```

M =

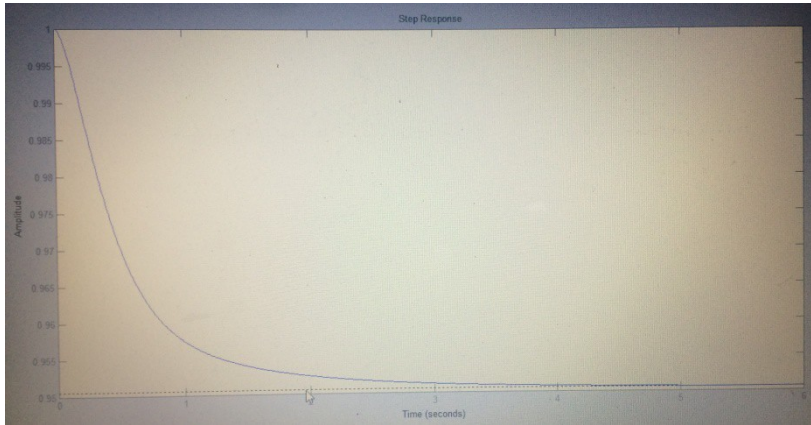
$$s^3 + 11 s^2 + 34 s + 24$$

-----

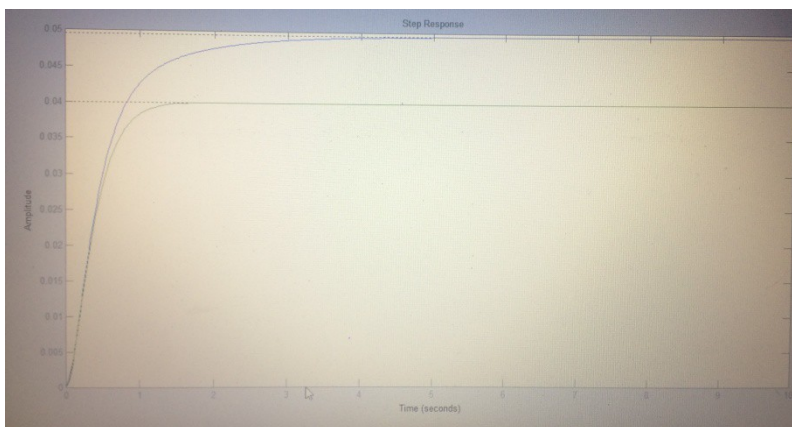
$$s^3 + 11 s^2 + 35 s + 25.25$$

Continuous-time transfer function.

```
>> step(M)
```



```
>> step(F,W,10)
```





Parte hecha a mano:

Diagrama de bloques inicial:

1) Valor final

$$\lim_{s \rightarrow 0} s \times \frac{1}{s^2+10s+25} \times \frac{1}{s} = \frac{1}{25} \approx 0,04$$

2) Valor final requerido

$$0,04 \times 20\% = 0,008 + 0,04 = 0,048$$

3) Error

$$ess = \lim_{s \rightarrow 0} s \times \frac{1}{1 + \frac{1}{s^2+10s+25}} \times \frac{1}{s} = \lim_{s \rightarrow 0} \frac{s^2+10s+25}{s^2+10s+26} = \frac{25}{26} \approx 0,96$$

4) Error

$$Error = 1 - 0,048 = 0,952$$

5) K modificador

$$K_{mod} = \frac{Z}{P} \times K_{inicial}$$

0,05 =  $\frac{Z}{P} \times 0,04$

$$\frac{Z}{P} = 1,25$$

$\therefore Z = -1,25$

$P = -1$

Diagrama de bloques modificado:

Diagrama de bloques simplificado:

6) Valor final

$$\lim_{s \rightarrow 0} s \times \frac{s+1,25}{s^3+11s^2+34s+25,25} \times \frac{1}{s} = \frac{1,25}{25,25} \approx 0,049$$

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