



UNIVERSIDAD FIDELITAS

Escuela de Ingeniería Eléctrica

Control automático

Tarea#4

Error para diferentes entradas (escalón, impulso y rampa)

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Parte a mano:

Tarea

Entrada escalon

$$E(s) = \frac{1}{1 + 1\left(\frac{1}{s}\right)} \cdot \frac{1}{s}$$

Error desaparece cuando el tiempo
tiende a infinito

$$\lim_{s \rightarrow 0} s \cdot \frac{1}{1 + \left(\frac{1}{s}\right)} = \frac{1}{1 + \frac{1}{s}} = \frac{1}{1 + \frac{1}{0}} = \frac{1}{1 + \infty} = \frac{1}{\infty} = K = 0$$

Entrada impulso

$$E(s) = \frac{1}{1 + 1\left(\frac{1}{s}\right)} \times 1$$

Error desaparece cuando el tiempo
tiende a infinito

$$\lim_{s \rightarrow 0} s \cdot \frac{1}{1 + \frac{1}{s}} \times 1 = \frac{s}{1 + \frac{1}{s}} = \frac{0}{1 + \frac{1}{0}} = \frac{0}{\infty} = \frac{0}{\infty} = K = 0$$

Entrada rampa

$$E(s) = \frac{1}{1 + 1\left(\frac{1}{s}\right)} \times \frac{1}{s^2}$$

El error va ser constante
en el infinito

$$\lim_{s \rightarrow 0} s \times \frac{1}{1 + \frac{1}{s}} \times \frac{1}{s^2} = \frac{1}{1 + \frac{1}{s}} \times \frac{1}{s} = \frac{1}{\frac{s+1}{s}} \times \frac{1}{s} = \frac{s}{s+1} \times \frac{1}{s}$$

$$= \frac{s}{s^2 + s} = \frac{0}{0+0} = \frac{0}{0}$$

$$L'H \quad \lim_{s \rightarrow 0} \frac{1}{2s+1} = \frac{1}{2(0)+1} = \frac{1}{1} = 1$$

Parte en matlab:

```
>> num=[0 0 1]
```

```
num =
```

```
0 0 1
```

```
>> den=[0 1 0]
```

```
den =
```

```
0 1 0
```

```
>> A=tf(num,den)
```

```
A =
```

```
1
```

```
-
```

```
s
```

Continuous-time transfer function.

```
>> H=[1]
```

```
H =
```

```
1
```

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

```
W =
```

```
1
```

```
-----
```

```
s + 1
```

Continuous-time transfer function.

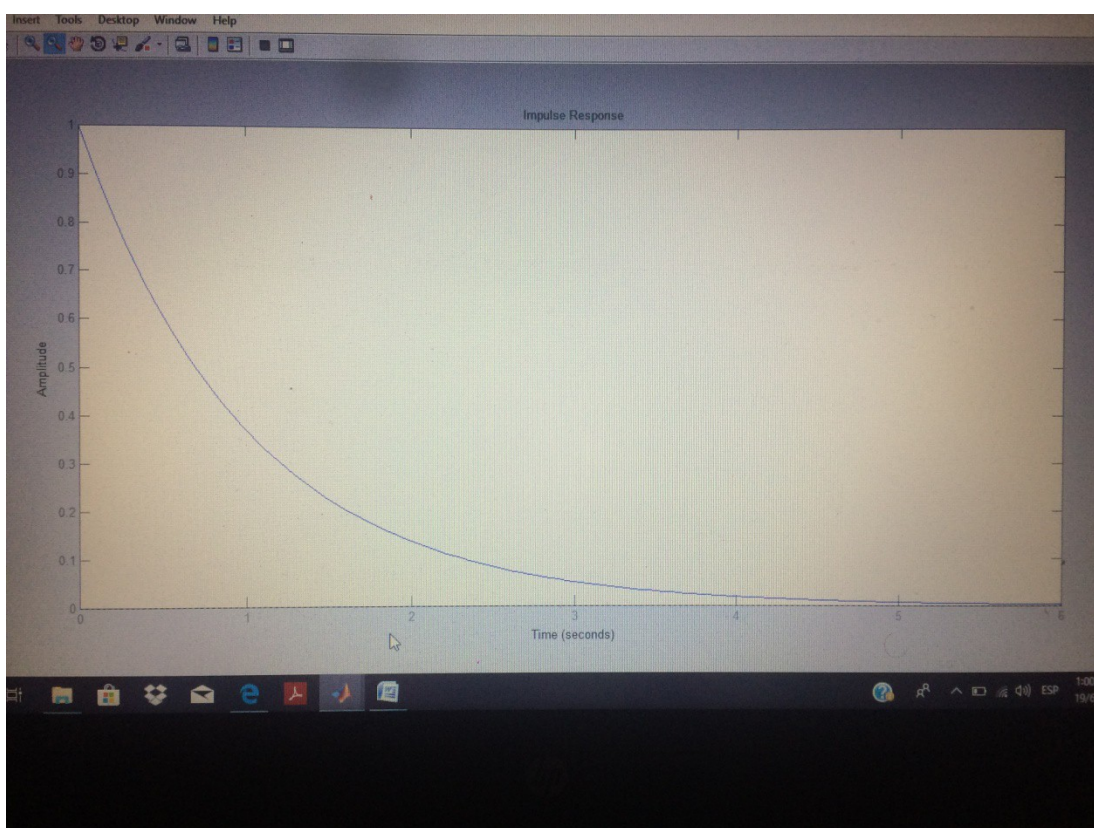
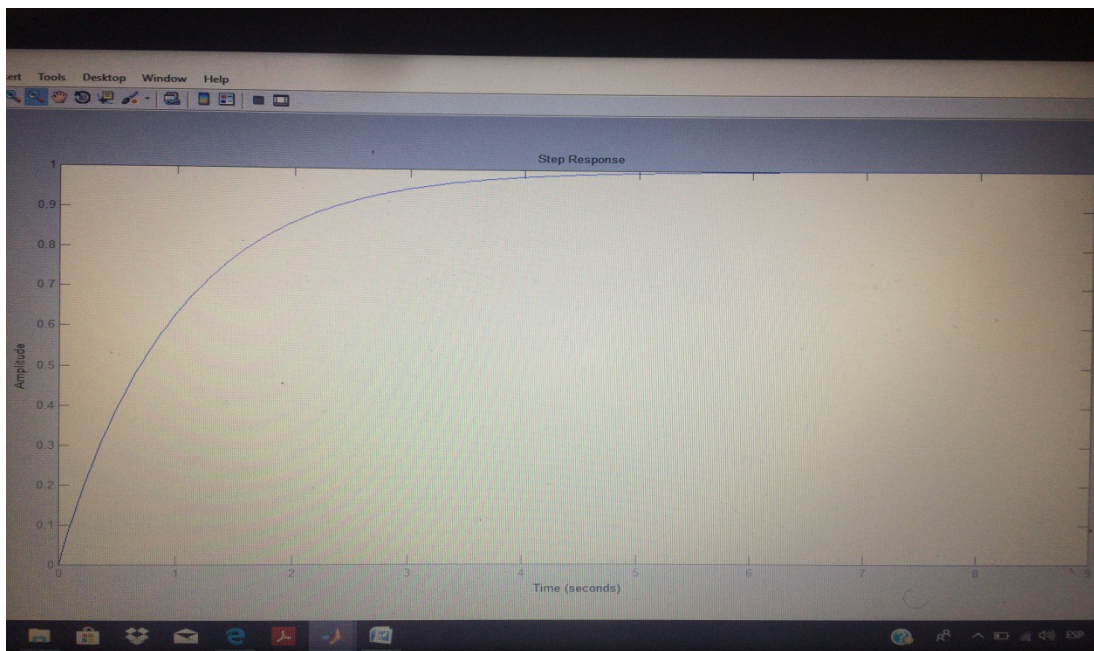
```
>> step(W)
```

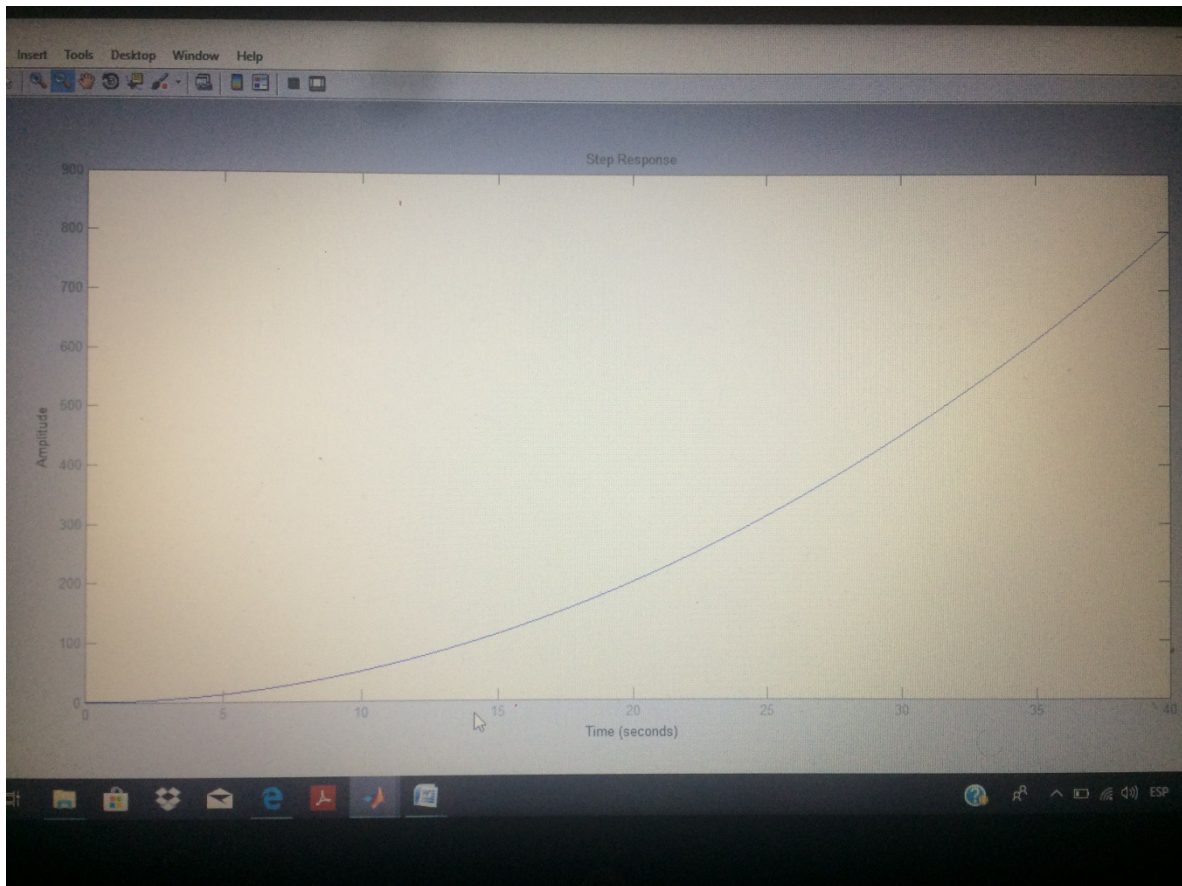
```
>> impulse(W)
```

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

```
>> step(A)
```

Graficas función de transferencia.





Graficas de error

W =

1

s + 1

Continuous-time transfer function.


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

P =

$$s + 1$$

$$s + 2$$

Continuous-time transfer function.

```
>> step(P)
```

```
>> impulse(P)
```

