Andrada - Ross

DEFINICIÓN FUNCION TRANSFERENCIA

$$G_1 = \frac{1}{s+2}$$

$$G_2 = \frac{s+1}{s+(1+i)}$$

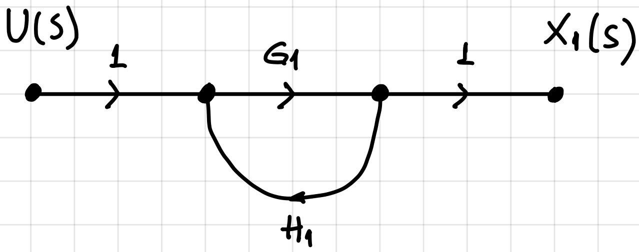
$$G_3 = \frac{1}{s+(1-i)}$$

$$x_0 = \begin{bmatrix} 0.1 & 0.3 & 0.2 \end{bmatrix}$$

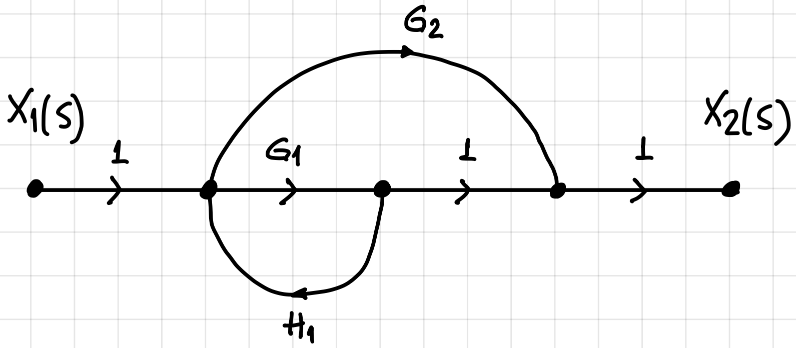
$$U(s) = \frac{1}{s}$$

$$U(s) \longrightarrow \boxed{G_1} \xrightarrow{X_1(s)} \boxed{G_2} \xrightarrow{X_2(s)} \boxed{G_3} \xrightarrow{X_3(s)} Y(s)$$

DIAGRAMA DE FLUJO DE SEÑAL

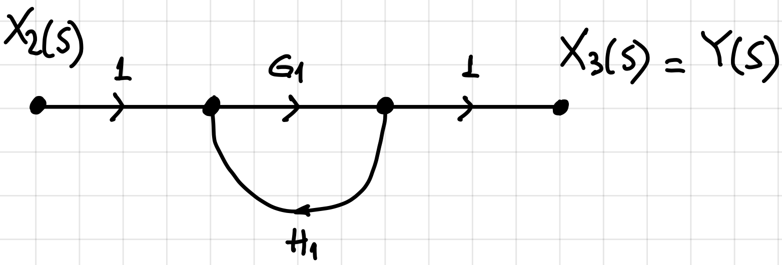
I)


$G_1 = \frac{1}{s} \qquad H_1 = -2$

II)


$G_1 = \frac{1}{s} \qquad G_2 = 1$

$H_1 = -(1+i)$

III)


$G_1 = \frac{1}{s}$

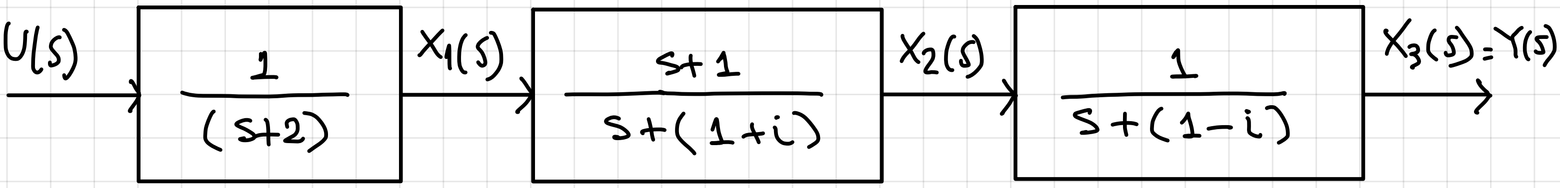
$H_1 = -(1-i)$

I, III) $\dfrac{G_1}{1 - G_1 \cdot H_1}$

$$\frac{\frac{1}{s}}{1 - \frac{1}{s}\cdot(-2)} = \frac{\frac{1}{s}}{1 + \frac{2}{s}} = \frac{\frac{1}{s}}{\frac{s+2}{s}} = \frac{1}{s+2}$$

$$\frac{\frac{1}{s}}{1 + \frac{1}{s}\cdot(1-i)} = \frac{\frac{1}{s}}{\frac{s+(1-i)}{s}} = \frac{1}{s+(1-i)}$$

II) $$\frac{G_1 + G_2}{1 - G_1 H_1} = \frac{\frac{1}{s} + 1}{1 + \frac{1}{s}(1+i)} = \frac{\frac{1+s}{s}}{\frac{s+(1+i)}{s}} = \frac{s+1}{s+(1+i)}$$



Función Transferencia

$$\frac{Y}{U}(s) = \frac{(s+1)}{(s+2)(s+1+i)(s+1-i)}$$

$$\frac{Y}{U}(s) = \frac{s+1}{(s+2)(s^2+s-is+s+1-i+is+i-i^2)}$$

$$\frac{Y}{U}(s) = \frac{s+1}{(s+2)(s^2+2s+2)} = \frac{(s+1)}{s^3+2s^2+2s+2s^2+4s+4}$$

$$\frac{Y}{U}(s) = \frac{s+1}{s^3+4s^2+6s+4}$$

Modelo en Espacio de Estado

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} -4 & -6 & -4 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} u(t)$$

$$y = \begin{bmatrix} 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \end{bmatrix} u(t)$$

Matlab

$$A = \begin{bmatrix} -4 & 6 & -4 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

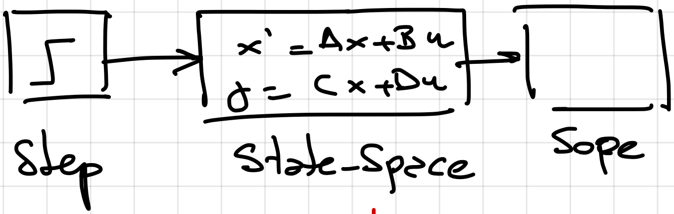
$$C = \begin{bmatrix} 0 & 1 & 1 \end{bmatrix}$$

$$D = \begin{bmatrix} 0 \end{bmatrix}$$

$$Ci = 0$$

$$Ci = \begin{bmatrix} 0.1 & 0.3 & 0.2 \end{bmatrix}$$

Simulink



0
0
1
0

Parametros

A = A

B = B

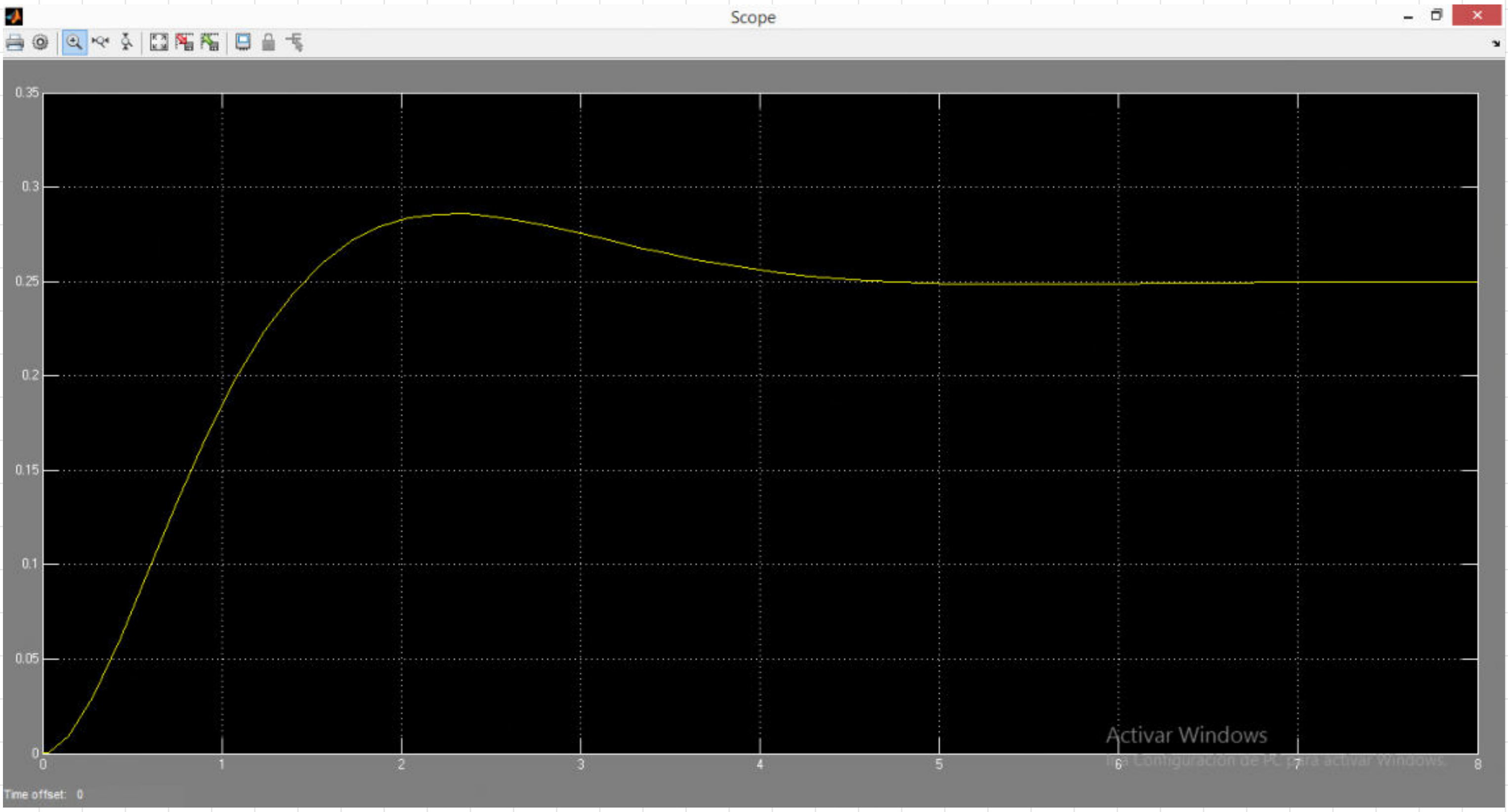
C = C

D = D

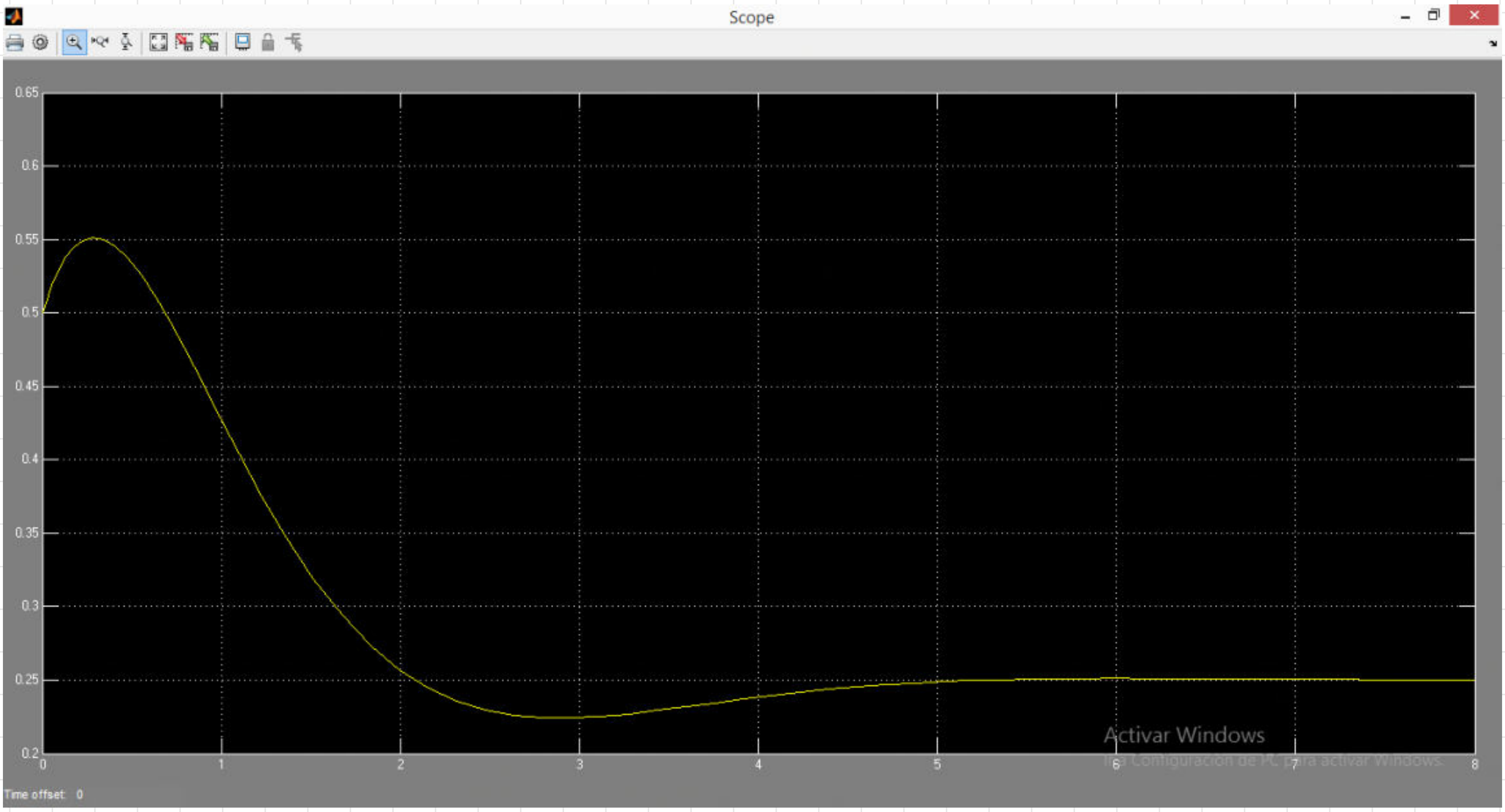
Cond. Iniciales

Ci

CIH


Scope
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
1
2
3
4
5
6
7
8
Activar Windows
Time offset: 0

CI


Scope
0.65
0.6
0.55
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0
1
2
3
4
5
6
7
8
Activar Windows
Time offset: 0