

## Tarea 3 ALS-NL

2) b)

$$\frac{30}{s^2 + 12s + 36} = \frac{30}{36} \frac{36}{s^2 + 12s + 36}$$

$$= \frac{5}{6} \frac{36}{s^2 + 12s + 36}$$

$$\zeta = \frac{1}{\xi_{wn}} = \frac{1}{(1)(6)} = \frac{1}{6}$$

$$T_s = \frac{1}{10} \zeta = \frac{1}{6} \times \frac{1}{10} = \frac{1}{60} = 0,017s //$$

abr 3-02:33 p.m.

4) a.

$$G(s) = \frac{2}{s+5} = \frac{Y(s)}{X(s)} \cdot \frac{X(s)}{U(s)}$$

$$\frac{Y(s)}{X(s)} = 2$$

$$\frac{X(s)}{U(s)} = \frac{1}{s+5}$$

$$y(t) = 2x(t)$$

$$x(s+5) = u(s)$$

$$\dot{x}(t) + 5x(t) = u(t)$$

$$\dot{x}(t) = -5x(t) + u(t)$$

$$x_1 = x(t)$$

$$\dot{x}_1 = \dot{x}(t) = -5x_1 + u = \dot{x}_1$$

$$y = 2x_1$$

$$\dot{x}_1 = [-5]x_1 + [1]u$$

$$y = [2]x_1$$

abr 3-03:16 p.m.

4) b.)

$$G(s) = \frac{20}{s^2 + 12s + 30} = \frac{Y(s)}{X(s)} \cdot \frac{X(s)}{U(s)}$$

$$y(t) = 20x(t)$$

$$\frac{X(s)}{U(s)} = \frac{1}{s^2 + 12s + 30}$$

$$\ddot{x} + 12\dot{x} + 30x = u(t)$$

$$\ddot{x} = -12\dot{x} - 30x + u$$

$$x_1 = x \Rightarrow \dot{x}_1 = \dot{x} = x_2 = \dot{x}_1$$

$$\dot{x}_2 = \ddot{x} = -12x_2 - 30x_1 + u = \dot{x}_2$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -30 & -12 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$y = [20 \ 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

abr 3-03:20 p.m.

4) c.

$$G(s) = \frac{26}{s^3 + 8s^2 + 29s + 52} = \frac{Y(s)}{X(s)} \cdot \frac{X(s)}{U(s)}$$

$$y(t) = 26x(t)$$

$$\ddot{\ddot{x}}(t) + 8\ddot{x}(t) + 29\dot{x}(t) + 52x(t) = u(t)$$

$$x_1 = x \Rightarrow \dot{x}_1 = \dot{x} = x_2 = \dot{x}_1$$

$$x_2 = \dot{x} \Rightarrow \dot{x}_2 = \ddot{x} = x_3 = \dot{x}_2$$

$$x_3 = \ddot{x} \Rightarrow \dot{x}_3 = \ddot{\ddot{x}} = -52x_3 - 29x_2 - 8x_1 + u$$

$$\dot{x}_3 = -52x_3 - 29x_2 - 8x_1 + u$$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -52 & -29 & -8 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [26 \ 0 \ 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

abr 3-03:26 p.m.

5) d)  $G(z) = \frac{0,06727}{z - 0,9231}$

$$G(z) = \frac{0,06727z^{-1}}{1 - 0,9231z^{-1}} = \frac{Y(z)}{X(z)} \cdot \frac{X(z)}{U(z)}$$

$$\frac{Y(z)}{X(z)} = \frac{0,06727z^{-1}}{1 - 0,9231z^{-1}}$$

Es Salida

$$\Rightarrow \text{Es Entrada}$$

$$X(z) - 0,9231z^{-1}X(z) = U(z)$$

$$X(z)(1 - 0,9231z^{-1}) = U(z)$$

$$\Rightarrow \text{Es Salida}$$

$$Y(z) = 0,06727z^{-1}X(z)$$

$$Y(z) = 0,06727X(z-1) \Rightarrow Y(k) = 0,06727X_1$$

$$x_1 = X(k-1)$$

$$x(k+1) = X(k)$$

$$x_1(k+1) = 0,9231X(k-1) + U(k) = 0,9231X_1 + U$$

$$\begin{bmatrix} X(k+1) \end{bmatrix} = \begin{bmatrix} 0,9231 \end{bmatrix} \begin{bmatrix} X_1 \end{bmatrix} + \begin{bmatrix} 1 \end{bmatrix} U$$

$$\begin{bmatrix} Y(k) \end{bmatrix} = \begin{bmatrix} 0,06727 \end{bmatrix} \begin{bmatrix} X_1 \end{bmatrix}$$

abr 3-03:34 p.m.

5) b)  $G(s) = \frac{0,001847z^{-1}}{z^2 - 1,847z + 0,8521}$

$$G(z) = \frac{0,001847z^{-1}}{z^2 - 1,847z + 0,8521} = \frac{Y(z)}{X(z)} \cdot \frac{X(z)}{U(z)}$$

$$\frac{Y(z)}{X(z)} = \frac{0,001847z^{-1}}{z^2 - 1,847z + 0,8521}$$

Es Salida

$$\Rightarrow \text{Es Entrada}$$

$$X(z) - 1,847z^{-1}X(z) + 0,8521z^{-2}X(z) = U(z)$$

$$\Rightarrow Y(z) = 0,001847z^{-1}X(z)$$

$$\Rightarrow X(z) = 1,847z^{-1}X(z) + 0,8521z^{-2}X(z) + U(z)$$

$$\Rightarrow Y(z) = 0,001847z^{-1}X(z)$$

$$X(k-1) = X_1(k) \Rightarrow X(k+1) = X(k)$$

$$X_1(k+1) = 1,847X_1(k) - 0,8521X_2(k) + U$$

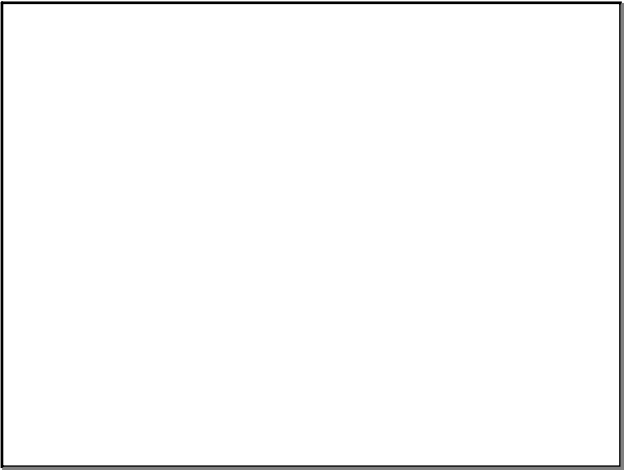
$$X(k-1) = X_1(k) \Rightarrow X(k+1) = X(k)$$

$$Y(k) = 0,001847X_1(k) + 0,001847X_2(k)$$

$$\begin{bmatrix} X(k+1) \\ X_2(k+1) \end{bmatrix} = \begin{bmatrix} 1,847 & -0,8521 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} X_1(k) \\ X_2(k) \end{bmatrix} + \begin{bmatrix} 1 \\ 0 \end{bmatrix} U$$

$$Y = \begin{bmatrix} 0,001847 & 0,001847 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix}$$

abr 3-03:53 p.m.



abr 3-04:01 p.m.