

# Tarea diagramas de flujo (Bonificación)

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

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

$$\rightarrow Y''' + 2Y'' + Y' + 3Y = 4u$$

$$\rightarrow q_1 = Y$$

$$q_2 = \dot{Y} = \dot{q}_1$$

$$q_3 = \ddot{Y} = \dot{q}_2$$

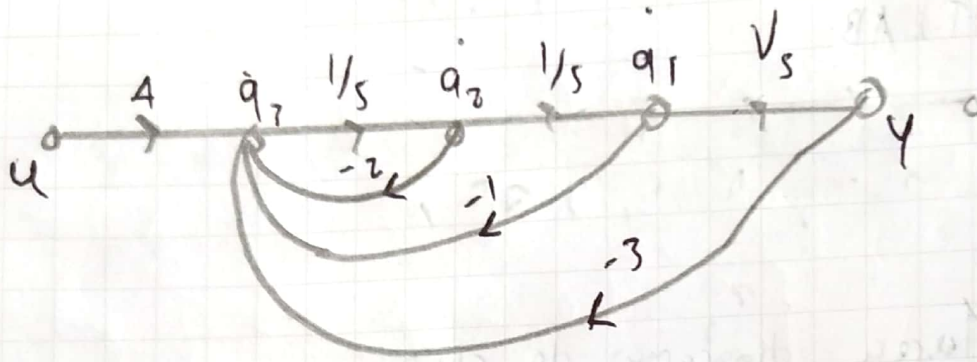
$$\dot{q}_3 = -2q_3 - q_2 - 3q_1 + 4u$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 4 \end{bmatrix} u$$

Primavera

$$Y = [1 \ 0 \ 0] \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} +$$

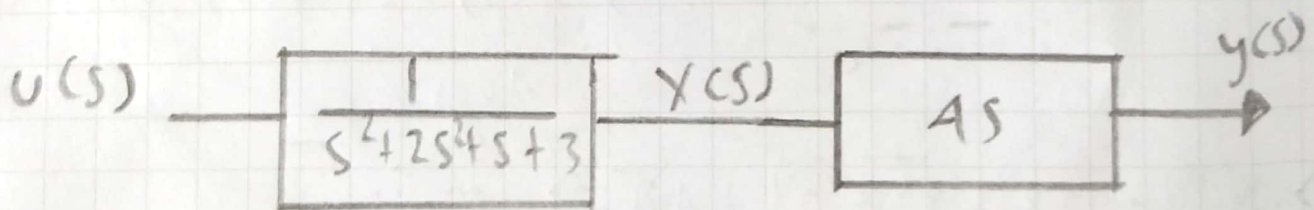
→



$$2) G(s) = \frac{4s}{s^3 + 2s^2 + s + 3} = \frac{Y(s)}{X(s)}$$

$$\bullet Y(s)(s^3 + 2s^2 + s + 3) = 4s u(s)$$

$$- Y(s)s^3 + Y(s)2s^2 + Y(s)s + 3Y(s) = 4s u(s)$$



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

$$\rightarrow X(s)(s^3 + 2s^2 + s + 3) = u(s)$$

$$\hookrightarrow x''' + 2x'' + x' + 3x = u$$

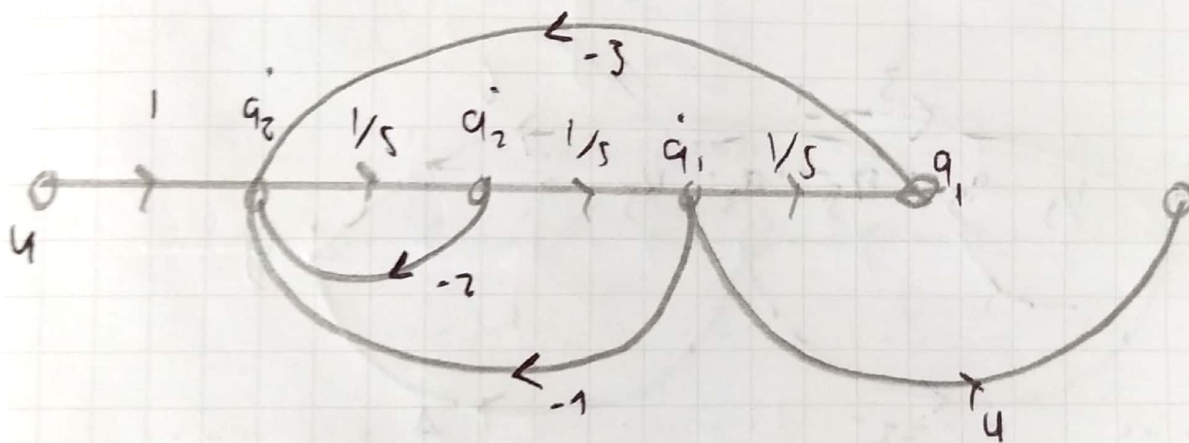
$$q_1 = x$$

$$q_2 = \dot{x} = \dot{q}_1$$

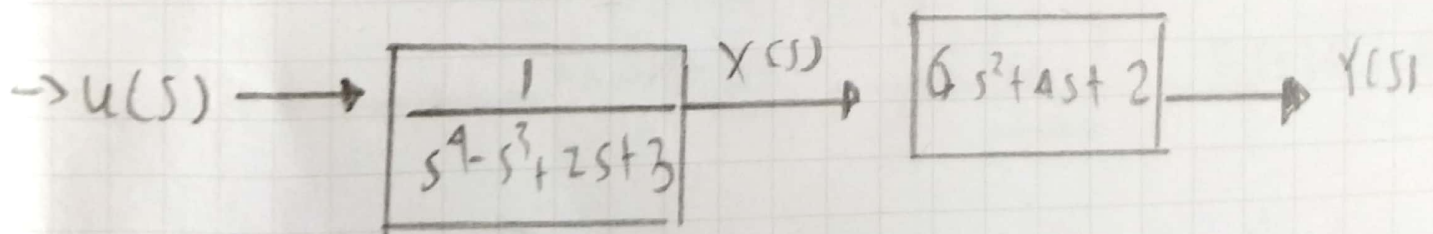
$$q_3 = \ddot{x} = \dot{q}_2 \rightarrow \dot{q}_3 = 4 - 2x'' - x' - 3x = 4 - 2q_3 - q_2 - 3q_1$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = [0 \ 4 \ 0] \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + [0] u$$



$$3. G(s) = \frac{6s^2 + 4s + 2}{s^4 + s^3 + 2s + 3} \rightarrow$$



$$\frac{X(s)}{u(s)} = \frac{1}{s^4 - s^3 + 2s + 3} \rightarrow X(s)(s^4 - s^3 + 2s + 3) = u(s)$$

$$\hookrightarrow \ddot{\ddot{x}} - \ddot{x} + 2\dot{x} + 3x = u$$



$$q_1 = x$$

$$q_2 = \dot{x} = \dot{q}_1$$

$$q_3 = \ddot{x} = \dot{q}_2 \rightarrow \dot{q}_4 = q_4 - q_2 + 3q_1 + 4$$

$$y(s) = x(s) \cdot (6s^2 + 4s + 2)$$

$$y(s) = x(s)6s^2 + x(s)4s + x(s)2$$

$$= 6\ddot{x} + 4\dot{x} + 2x \rightarrow 6q_3 + 4q_2 + 2q_1$$

$$\hookrightarrow y = \begin{bmatrix} 2 & 4 & 6 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix}$$

