

Diagrama de flujo.

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

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

$$Y(s)(s^3 + 2s^2 + s + 3) = 4U(s)$$

$$s^3 Y(s) + 2s^2 Y(s) + s Y(s) + 3 Y(s) = 4U(s)$$

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

$$q_1 = Y$$

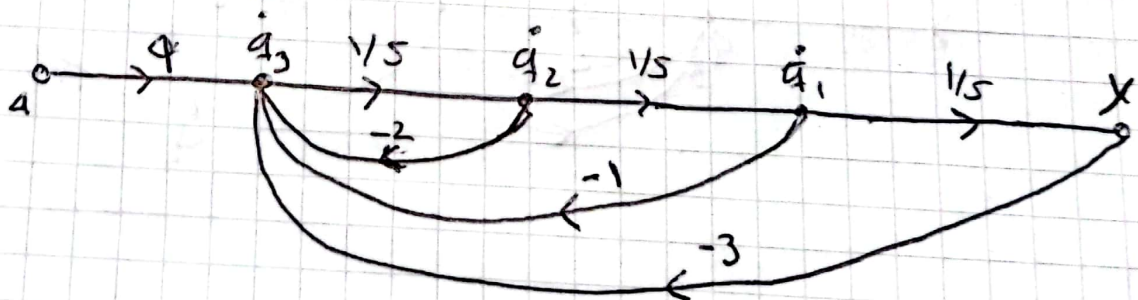
$$q_2 = \dot{Y} = \dot{q}_1$$

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

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

$$Y = [1 \ 0 \ 0] \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + [0] \cdot 4$$

Diagrama de flujo de Señal.



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

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

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

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

$$q_1 = x$$

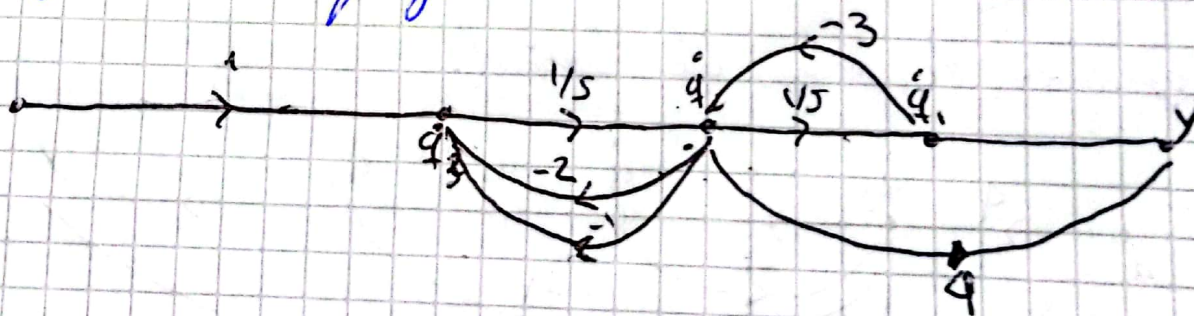
$$q_2 = \dot{x} = \dot{q}_1$$

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

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

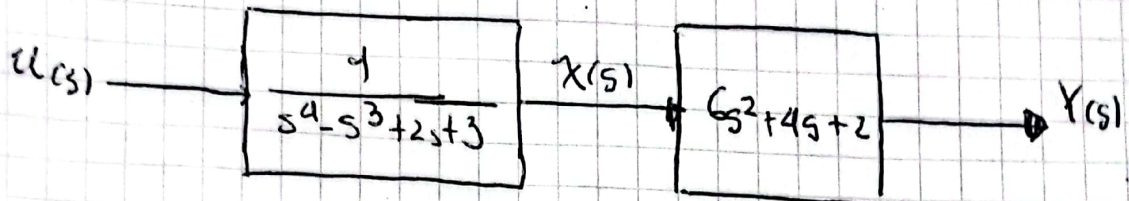
$$y = [0 \ 0 \ 0] \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + [0] u$$

Diagrama de flujo de señal



3.

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



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

$$q_1 = X$$

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

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

$$q_4 = \ddot{\ddot{X}} - \ddot{X} \rightarrow \dot{q}_4 = q_4 - 2q_2 + 3q_1 + u$$

$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \\ \dot{q}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ 3 & -2 & 0 & 1 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \\ q_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} u$$

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

Diagrama de flujo

