Tarea diagramas de flujo

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

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

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

→ Transformada inversa

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

- $q_1 = y$

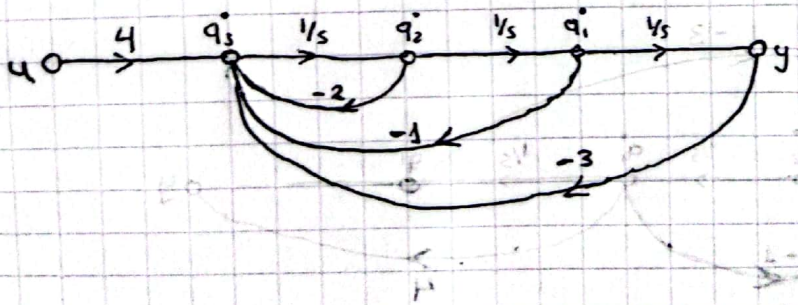
  $q_2 = \dot{y} = q_1'$

  $q_3 = \ddot{y} = q_2' \rightarrow q_3' = -2q_3 - q_2 - 3q_1 + 4u$

$$\begin{bmatrix} q_1' \\ q_2' \\ q_3' \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 4 \end{bmatrix} \cdot u$$

$$y = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + [0] \cdot u$$

- Diagrama de flujo



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

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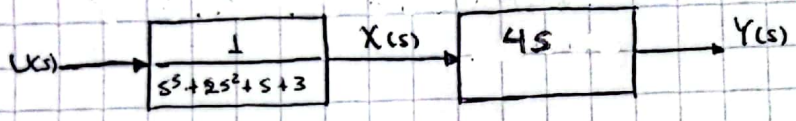


$\dfrac{X(s)}{U(s)} = \dfrac{1}{s^3+2s^2+s+3} \rightarrow X(s)(s^3+2s^2+s+3) = U(s)$

↳ $x''' + 2x'' + x' + 3x = u$

$q_1 = x$

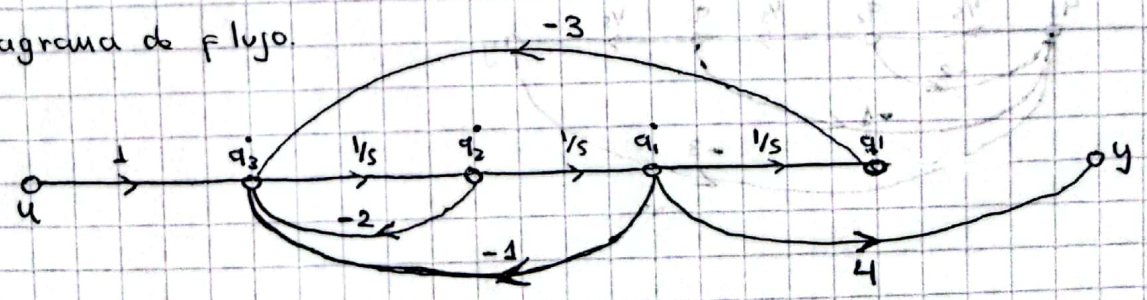
$q_2 = \dot{x} = q_1$

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

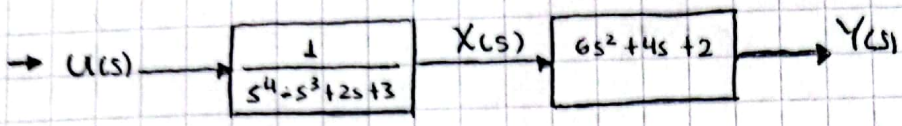
$$\begin{bmatrix} \dot{q}_1 \\ \dot{q}_2 \\ \dot{q}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} q_1 \\ q_2 \\ q_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

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

- Diagrama de flujo.



3. $G(s) = \dfrac{6s^2 + 4s + 2}{s^4 - s^3 + 2s + 3}$ →



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

$$\ddddot{x} - \dddot{x} + 2\dot{x} + 3x = u$$

$q_1 = x$

$q_2 = \dot{x} = q_1^{\cdot}$

$q_3 = \ddot{x} = q_2^{\cdot}$

$q_4 = \dddot{x} = q_3^{\cdot} \rightarrow \dot{q_4} = +q_4 - 2q_2 + 3q_1 + u$

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

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

$y(s) = X(s)\,6s^2 + X(s)\,4s + X(s)\,2 = 6\ddot{x} + 4\dot{x} + 2x \rightarrow 6q_3 + 4q_2 + 2q_1$

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

• Diagrama de flujo.