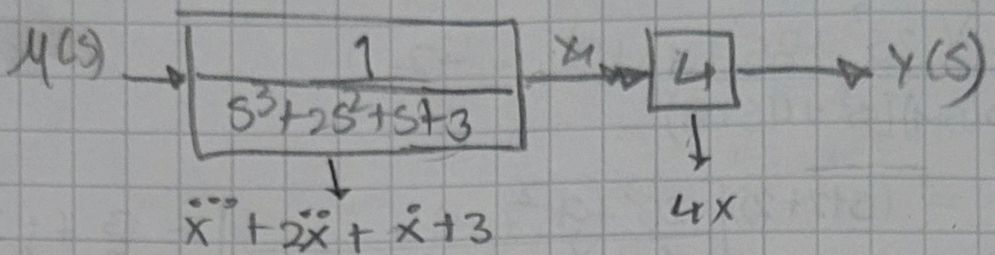
Bonificación

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

2. $G(s) = \dfrac{45}{s^3+2s^2+s+3}$

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

1.



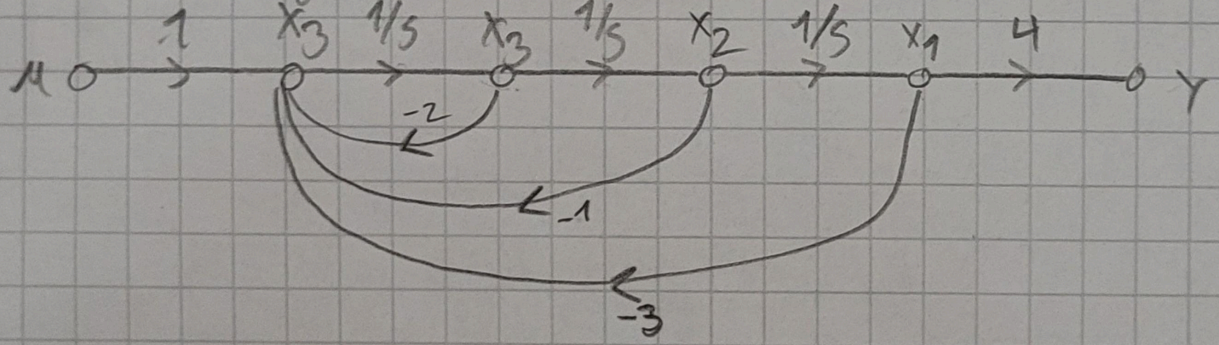
$x = x_1$ $\quad \dot{x}_3 + 2x_3 + x_2 + 3x_1 = u$ $\quad \cdot\ 4x = y$

$\dot{x} = x_2$

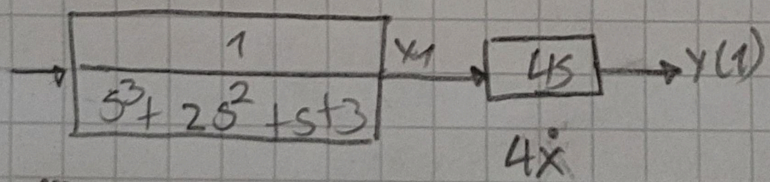
$\ddot{x} = x_3$ $\quad \dot{x}_3 = u - 2x_3 - x_2 - 3x_1$

$\dddot{x} = \dot{x}_3$ $\quad y = 4x_1$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u \qquad y = \begin{bmatrix} 4 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + [0]\,u$$



2.



$\dddot{x} + 2\ddot{x} + \dot{x} + 3x$

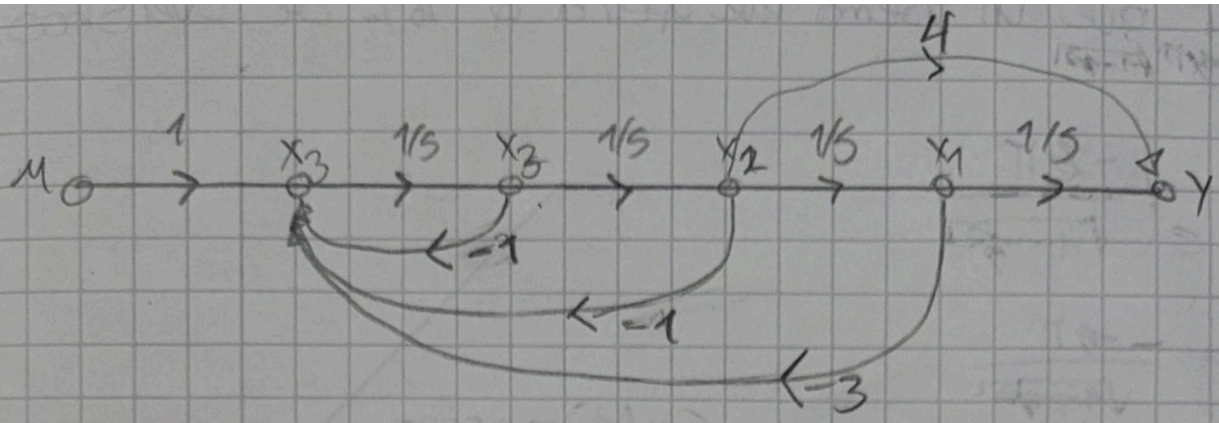
$x = x_1$ $\quad \dot{x}_3 + 2x_3 + x_2 + 3x_1 = u$

$\dot{x} = x_2$ $\quad \dot{x}_3 = u - 2x_3 - x_2 - 3x_1$

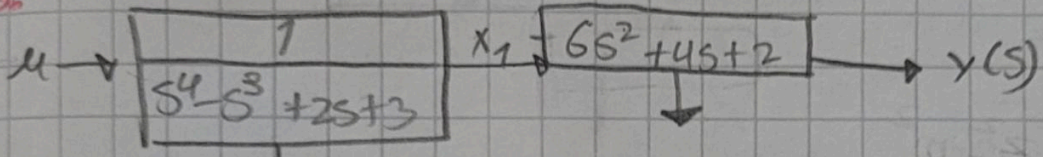
$\ddot{x} = x_3$

$\dddot{x} = \dot{x}_3$ $\quad y = 4x_2$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u \qquad y = \begin{bmatrix} 0 & 4 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + [0]\,u$$



3.



$\dddot{x} - \ddot{x} + 2\dot{x} + 3x = u \qquad 6\ddot{x} + 4\dot{x} + 2x = y$

$\dot{x}_4 = u + x_4 - 2x_2 - 3x_1$

$\dot{x}_4 - x_4 + 2x_2 + 3x_1 = u \qquad 6x_3 + 4x_2 + 2x_1 = y$

$x = x_1$

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

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

$\dddot{x} = x_4 = \dot{x}_3$

$\dddot{x} = \dot{x}_4$

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \\ \dot{x}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -3 & -2 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} u \qquad y = \begin{bmatrix} 2 & 4 & 6 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + [0]\,u$$