Taller (Repaso)

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

$x_1 = x_1$

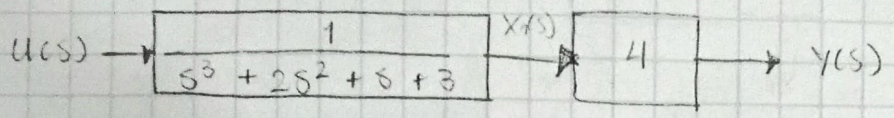
$x_2 = \dot{x}_1 = \dot{x}$

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

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

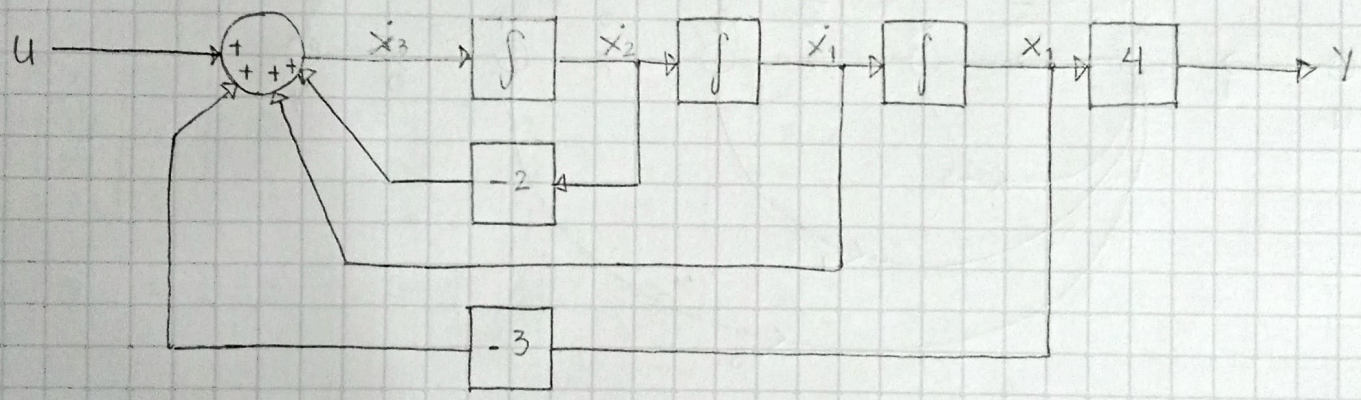
$\dddot{x} = u - 2\ddot{x}_1 - \dot{x}_1 - 3x_1$

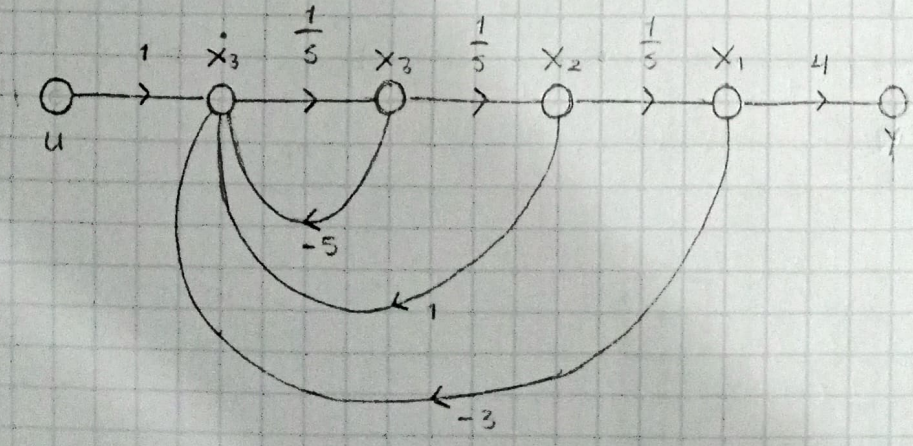
$\dot{x}_3 = u - 2\dot{x}_2 - \dot{x} - 3x$



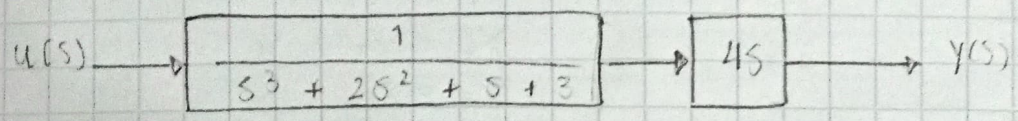
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 4 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$



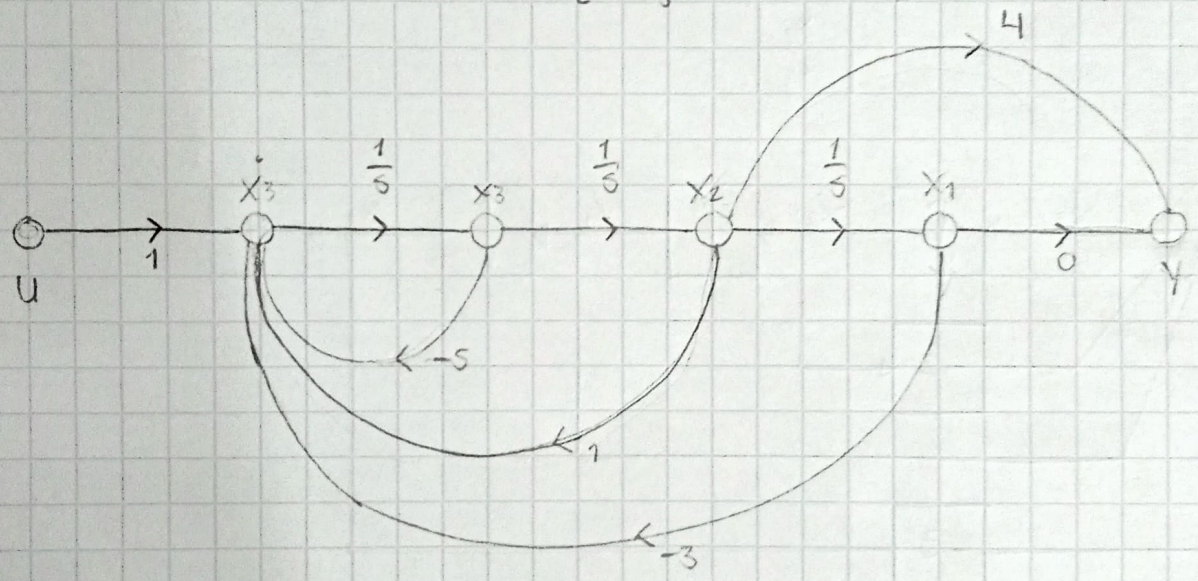


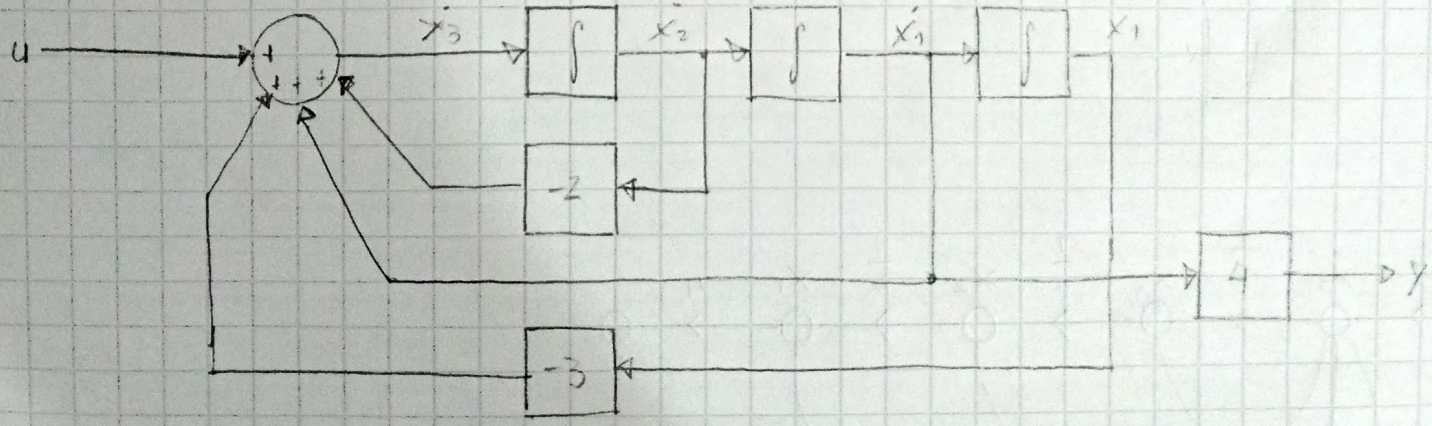
② $G(s) = \dfrac{45}{s^3 + 2s^2 + 5 + 3}$



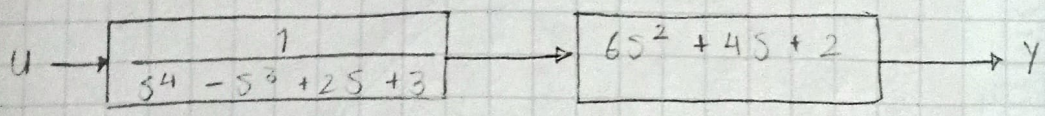
$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -3 & -1 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 0 & 4 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$





③ $EO) = \frac{6s^2 + 4s + 2}{s^4 - s^3 + 2s + 3}$



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

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

$6\ddot{x} + 4\dot{x} + 2x = y$

$6\dot{x}_2 + 4\dot{x}_1 + 2x_1 = y$

$6x_3 + 4x_2 + 2x_1 = y$

$x_1 = x$

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

$x_3 = \dot{x}_2 = \ddot{x}_1 = \ddot{x}$

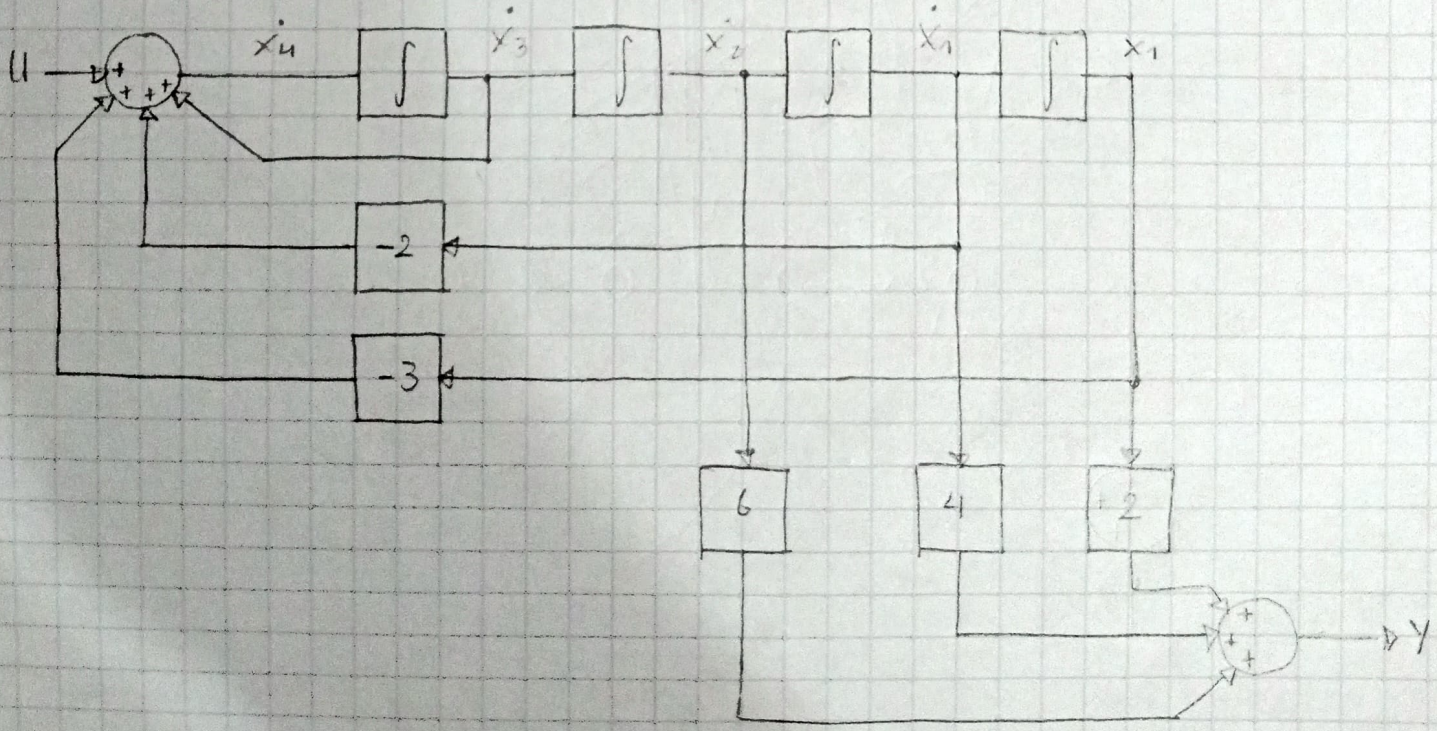
$x_4 = \dot{x}_3 = \ddot{x}_1 = \dddot{x}$

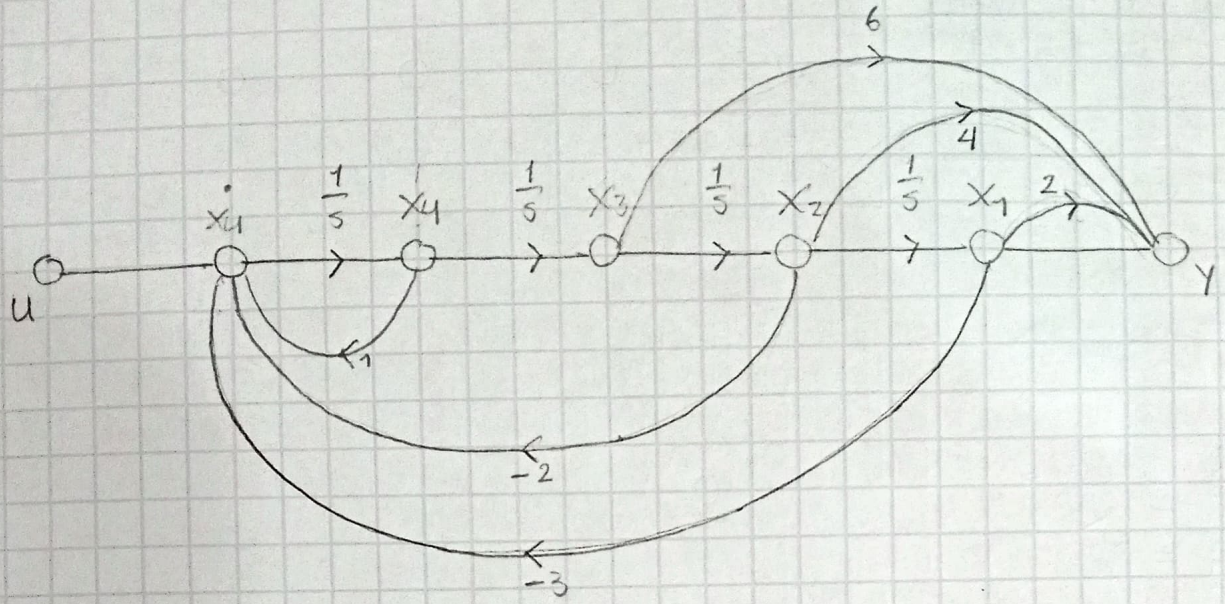
$\dot{x}_4 = \ddot{x}_1 = \dddot{x}$

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

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \\ \dot{x}_4 \end{bmatrix} = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \\ -3 & -2 & 0 & 1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 0 \\ 1 \end{bmatrix} u$$

$$y = \begin{bmatrix} 2 & 4 & 6 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{bmatrix}$$




u
$\dot{x}_4$
$\frac{1}{5}$
x_4
$\frac{1}{5}$
x_3
$\frac{1}{5}$
x_2
$\frac{1}{5}$
x_1
6
4
2
Y
1
-2
-3