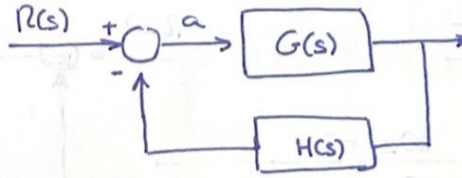
Tarea 4



$$q = \begin{bmatrix} 2 & +1 & -3 \\ 3 & 2 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$a = R(s) - Y \cdot H$

$Y = a \cdot G = R(s) \cdot G(s) - G \cdot Y \cdot H.$

$Y[1 + G \cdot H] = R \cdot G \rightsquigarrow Y(s) = \dfrac{R(s)\,G(s)}{1 + G(s) \cdot H(s)}$

Función de Transf $\rightsquigarrow$ $\boxed{\dfrac{Y(s)}{R(s)} = \dfrac{G(s)}{1 + G(s) \cdot H(s)}}$

$$F_1 = \frac{\frac{s^2+5s+2}{s^3+3s^2+3s+1}}{1 + \frac{s^2+5s+2}{s^3+3s^2+3s+1} \cdot 1} = \frac{(s^3+3s^2+3s+1) \cdot s^2+5s+2}{(s^3+3s^2+3s+1) \cdot [(s^3+3s^2+3s+1) + s^2+5s+2]}$$

$$= \frac{s^2+5s+2}{s^3+4s^2+8s+3.}$$

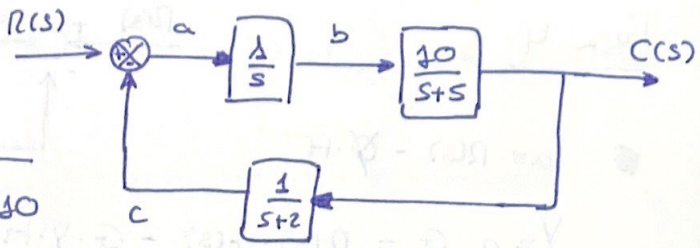
$$F_2 = \frac{\frac{7s^2+s+2.}{s^3+s^2+1.}}{1 + \frac{7s^2+s+2}{s^3+s^2+1} \cdot \frac{1}{(s+1)}} = \frac{(7s^2+s+2)(s^3+s^2+1) \cdot (s+1)}{[(s^3+s^2+1)(s+1) + (7s^2+s+2) \cdot 1.] (s^3+s^2+1)}$$

$$= \frac{(7s^2+s+2)(s+1)}{[(s^3+s^2+1)(s+1) + (7s^2+s+2)]} \cdot = \frac{7s^3+8s^2+3s+2}{s^4+2s^3+8s^2+2s+3.}$$

$$F_3 = \frac{\frac{s+1}{s^2+5s}}{1 + \frac{s+1}{s^2+5s} \cdot \frac{s+2}{s^2+4s+5}} = \frac{(s+1) \cdot (s^2+5s) \cdot (s^2+4s+5)}{[(s^2+5s) \cdot (s^2+4s+5) + (s+1)(s+2)] \cdot (s^2+5s)}$$

$$= \frac{(s+1)(s^2+4s+5)}{[(s^2+5s) \cdot (s^2+4s+5) + (s+1)(s+2)]} \cdot = \frac{s^3+5s^2+9s+5.}{s^4+9s^3+26s^2+28s+2}$$

Tarea 5



$$\frac{C(s)}{R(s)} = \frac{10s + 20}{s^3 + 7s^2 + 10s + 10}$$

$a = R(s) + c = R(s) + C(s) \cdot \frac{1}{s+2}$

$b = \frac{1}{s} \cdot a.$

$C(s) = b \cdot \frac{10}{s+5}$

$b = \frac{1}{s} R(s) + C(s) \cdot \frac{1}{s} \cdot \frac{1}{s+2}$

$c = C(s) \cdot \frac{1}{s+2}$

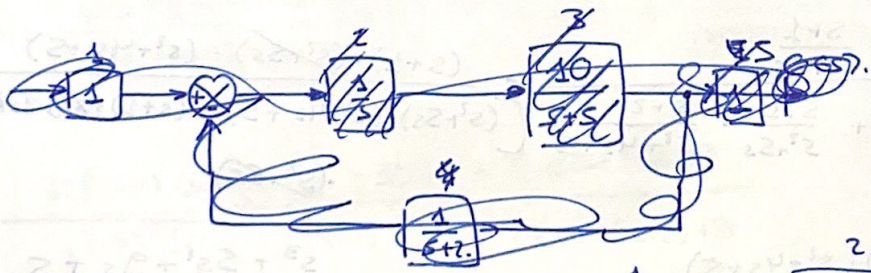
$C(s) = \frac{1}{s} \cdot \frac{10}{s+5} \cdot R(s) + C(s) \frac{1}{s} \cdot \frac{1}{s+2} \cdot \frac{10}{s+5}.$

$$C(s) = \frac{10}{s^2+5s} R(s) + C(s) \cdot \frac{10}{s^3+7s^2+10s}.$$

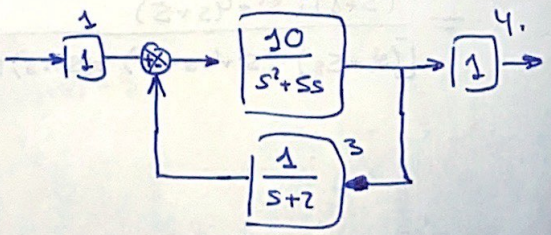
$$C(s) - C(s) \cdot \frac{10}{s^3+7s^2+10s} = \frac{10}{s^2+5s} R(s).$$

$$G(s) = \frac{C(s)}{R(s)} = \frac{1/(s^2+5s)}{1 - \frac{10}{s^3+7s^2+10s}}$$

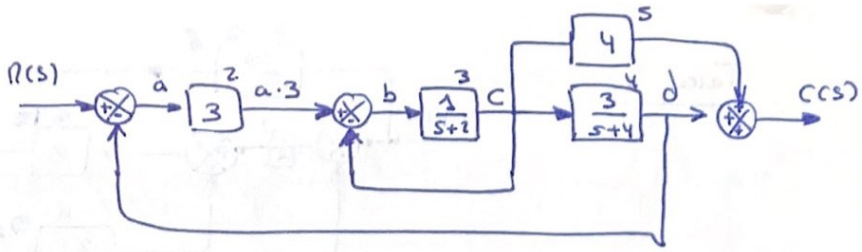
$$G(s) = \frac{s^3+7s^2+10s}{\left[s^3+7s^2+10s-10\right](s^2+5s)} = \frac{10s+5}{s^3+7s^2+10s-10}$$



$$q = \begin{bmatrix} 2 & 1 & -13 \\ 3 & 2 & 0 \\ 4 & 2 & 0 \end{bmatrix}$$



Tarea 6:



$C(s) = 4c + d$

$a = R(s) - d.$

$b = a \cdot 3 - c. = 3R(s) - 3d - c.$

$c = b \cdot \frac{1}{s+2} = \frac{3R(s)}{s+2} - \frac{3d}{s+2} - \frac{c}{s+2.} \Rightarrow \boxed{c = \frac{3R(s) - 3d.}{\left(1 + \frac{1}{s+2.}\right) s+2} = \frac{3R(s) - 3d.}{s+2+1} = \frac{3R(s) - 3d}{s+3.}}$

$d = c \cdot \frac{3}{s+4}$

$d = \frac{9R(s) - 9d}{(s+4)(s+3)} = \frac{9R(s)}{(s+4)(s+3)} - \frac{9d}{(s+4)(s+3)}$

$$\boxed{d = \frac{\frac{9R(s)}{(s+4)(s+3)}}{1 + \frac{9}{(s+4)(s+3)}} = \frac{9R(s)}{(s+4)(s+3) + 9}}$$

$$C(s) = \frac{12R(s) - 12d}{s+3} + \frac{9(R(s))}{(s+4)(s+3)+9.}$$

~~$C(s) = \frac{12R(s) - 12[(s+4)(s+3)+9] \cdot 12c}{s+3}$~~

$$C(s) = \frac{12R(s) - 12\,\frac{9R(s)}{(s+4)(s+3)+9}}{s+3} + \frac{9R(s)}{(s+4)(s+3)+9}$$

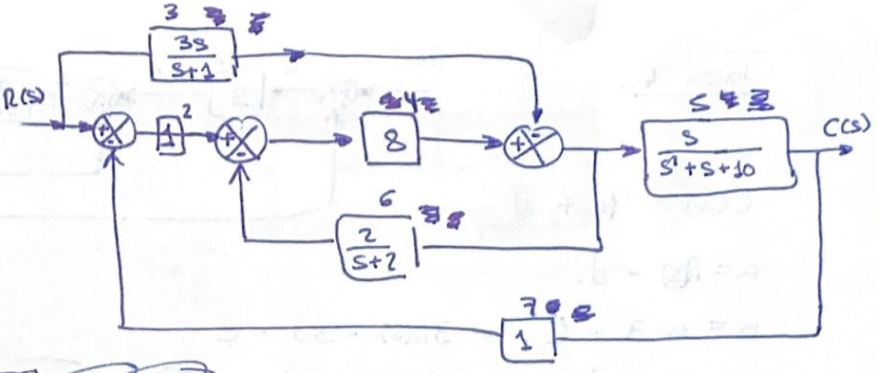
$$C(s) = \frac{12R(s)[(s+4)(s+3)+9] - 108R(s)}{(s+3)^2(s+4) + 9(s+3)} + \frac{9R(s)}{(s+4)(s+3)+9}$$

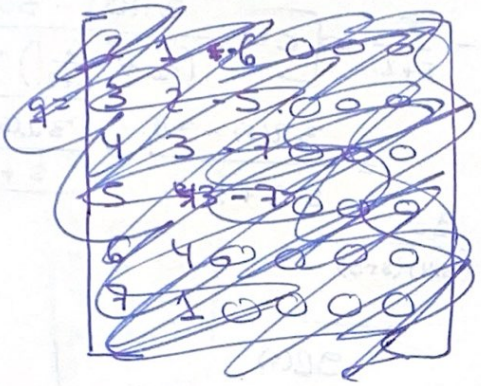
$$\frac{C(s)}{R(s)} = \frac{12[(s+4)(s+3)+9] - 108}{(s+3)^2(s+4) + 9(s+3)} + \frac{9}{(s+4)(s+3)+9}$$

$$\frac{C(s)}{R(s)} = \frac{12(s+4)(s+3)}{(s+3)^2(s+4) + 9(s+3)} + \frac{9}{(s+4)(s+3)+9}$$

$$\boxed{\frac{C(s)}{R(s)} = \frac{12s + 57}{(s+3)(s+4)+9}}$$

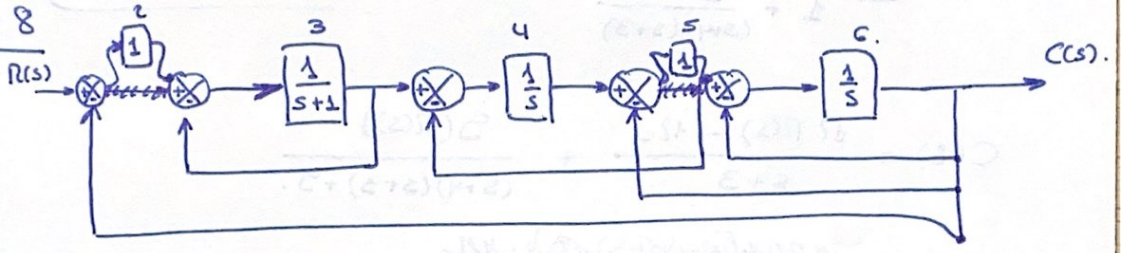
Tarea 7:





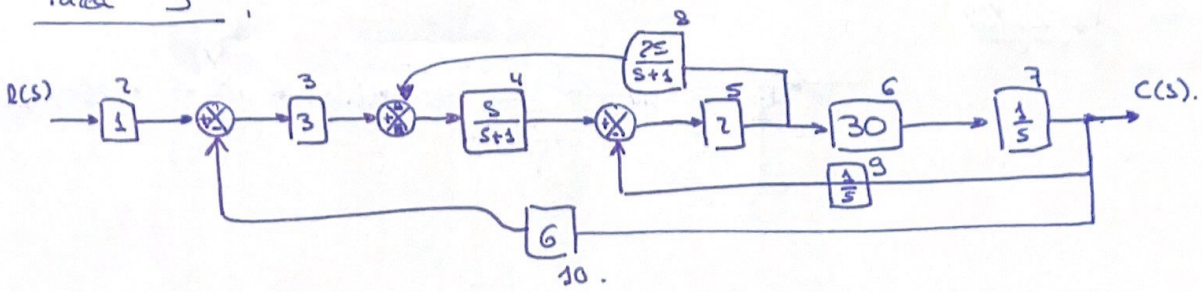
$$q = \begin{bmatrix} 2 & 1 & -7. \\ 3 & 1. & 0 \\ 4 & 2 & -6. \\ 5 & 4 & -3. \\ 6 & 4 & -3. \\ 7 & 5 & 0 \end{bmatrix}$$

Tarea 8



$$q = \begin{bmatrix} 2 & 1 & -6. \\ 3 & 2 & -3 \\ 4 & 3 & -5 \\ 5 & 4 & -6. \\ 6 & 5 & -6. \\ 7 & 6. & 0. \end{bmatrix}$$

Tarea 9 :



$$q = \begin{bmatrix} 2 & 1 & 0 \\ 3 & 2 & -10 \\ 4 & 3 & -8 \\ 5 & 4 & -9 \\ 6 & 5 & 0 \\ 7 & 6 & 0 \\ 8 & 5 & 0 \\ 9 & 7 & 0 \\ 10 & 7 & 0 \\ 11 & 7 & 0 \end{bmatrix}$$