Nome: Bruno Akira Oshiro

① $(I+GH)^{-1}G = G(I+HG)^{-1}$

$(I+GH)(I+GH)^{-1}G(I+HG) = (I+GH)\cdot G(I+HG)^{-1}\cdot(I+HG)$

$G(I+HG) = (I+GH)G$

$G+GHG = G+GHG$ ⇒ Iguais

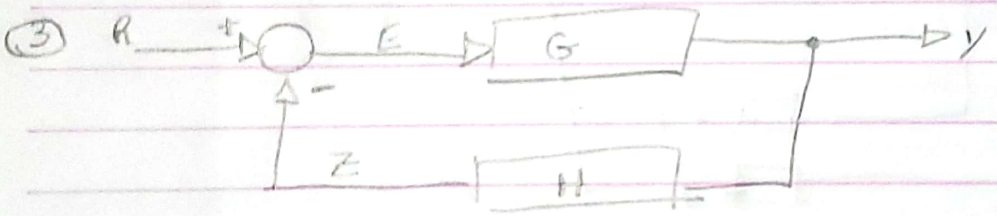
② $Z = HG(R-Z) \Rightarrow (I+HG)Z = HGR \Rightarrow \underline{Z = (I+HG)^{-1}HGR}$

$HG(I+GH)^{-1} = (I+HG)^{-1}HG$

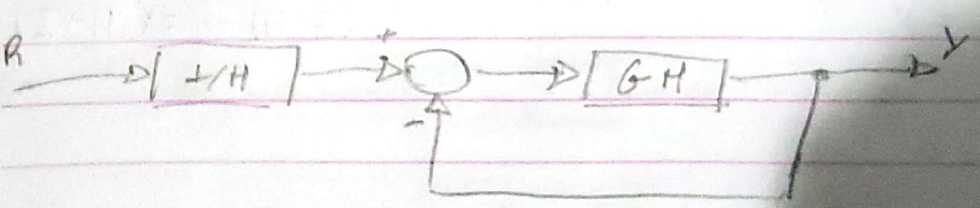
$(I+HG)HG = HG(I+GH)$

$HG+HG\cdot HG = HG+HGHG$ ⇒ Iguais

③



$Y = G(R-Z) = G(R-HY) \Rightarrow (1+H)Y = GR \Rightarrow \underline{Y = (1+H)^{-1}GR}$



$Y = GH(1/H\cdot R - Y)$

$(1+GH)Y = GR \Rightarrow \underline{Y = (1+GH)^{-1}GR}$ ⇒ Iguais

④ $Y = \frac{G}{1+G(H-1)} (R-Y)$

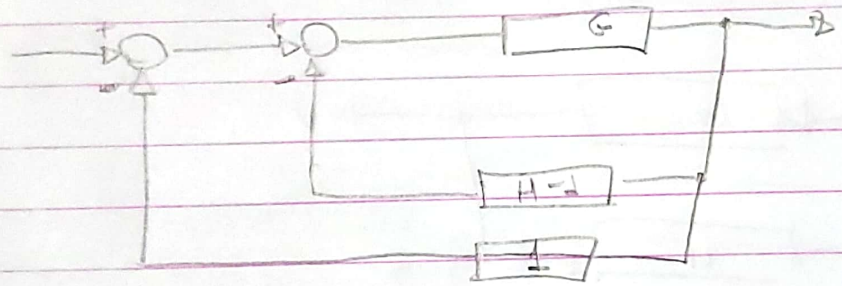
$$\left(1 + \frac{G}{1+G(H-1)}\right) Y = \frac{G}{1+G(H-1)} \cdot R$$

$$\frac{1+G(H-1)+G}{1+G(H-1)} Y = \frac{G}{1+G(H-1)} R$$

$$(1+GH) Y = GR$$

$$Y = \frac{G}{1+GH} R$$

⑤



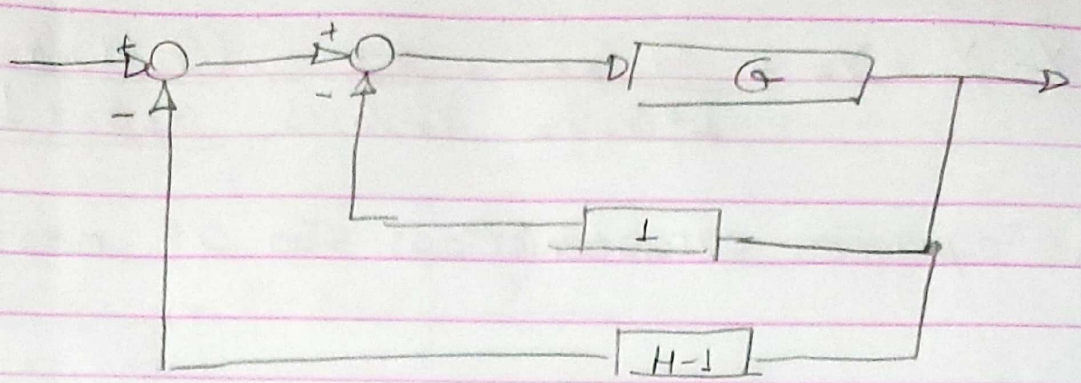
$$G(R - Y - (H-1)Y) = Y$$

$$G(R - HY) = Y$$

$$(HG+1) Y = GR$$

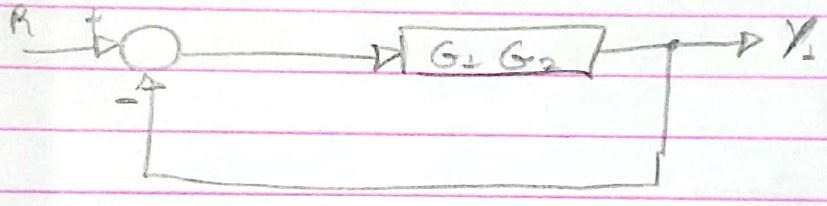
$$Y = \frac{G}{HG+1} R$$

(6)



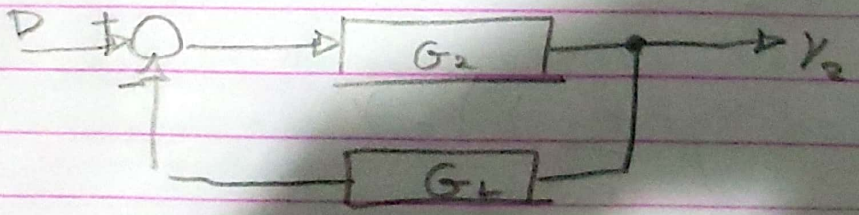
$$Y = G(R - (H-1)Y - Y)$$
$$Y = G(R - HY)$$
$$Y = \frac{G}{HG+1} R$$

(7)



$$Y_1 = G_1 G_2 (R - Y_1)$$
$$Y_1 = \frac{G_1 G_2}{1 + G_1 G_2} R$$

(8)



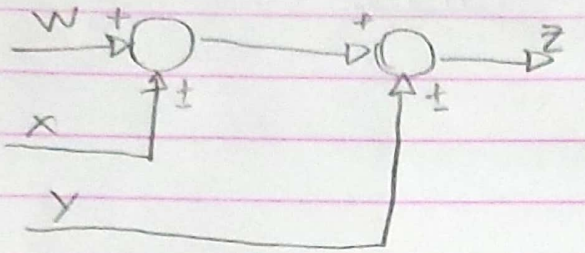
$$Y_2 = G_2 (D - G_1 Y_2)$$

$$Y_2 = \frac{G_2}{1 + G_1 G_2} R$$

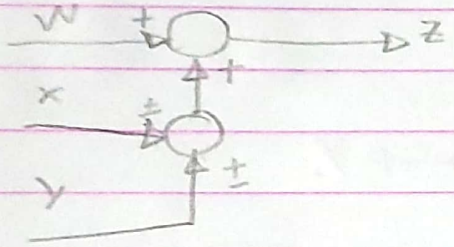
(9) $Y = Y_1 + Y_2 = \frac{G_1 G_2}{1 + G_1 G_2} + \frac{G_2}{G_1 G_2 + 1} = \frac{(G_1 + 1) G_2}{G_1 G_2 + 1}$

As equações características são as mesmas

(10)

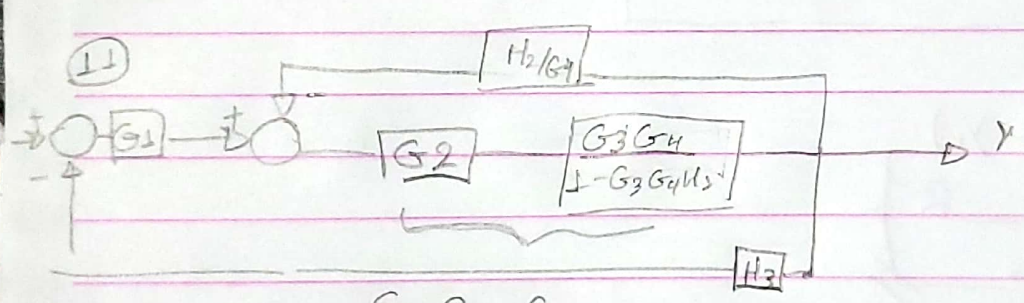


$Z = W \pm X \pm Y$



$Z = W + (\pm X \pm Y) = W \pm X \pm Y$

(11)



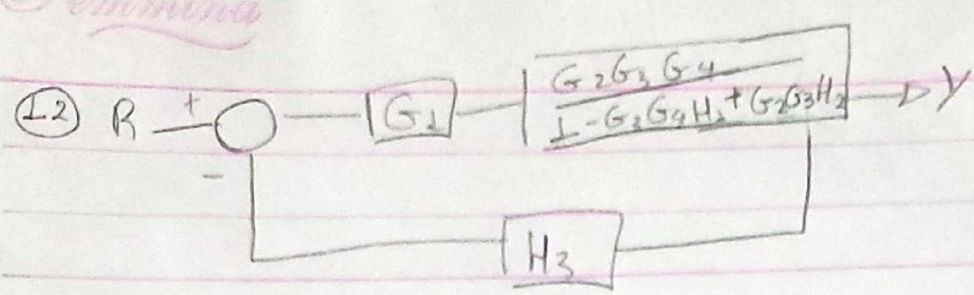
$$\frac{G_3 G_4 \cdot G_2}{1 - G_3 G_4 H_3}$$

$$\frac{G_2 G_3 G_4}{1 - G_3 G_4 H_3} \cdot \left(G_1 \left(R - H_3 Y \right) - \frac{H_2}{G_4} Y \right) = Y$$

$$\frac{G_1 G_2 G_3 G_4}{1 - G_3 G_4 H_3} R = \left[\frac{G_3 G_4}{1 - G_3 G_4 H_3} \left(G_1 H_3 + \frac{H_2}{G_4} \right) + 1 \right] Y$$

$$Y/R = G_1 G_2 G_3 G_4 / (1 - G_3 G_4 H_3 + G_2 G_3 H_2 + G_1 G_2 G_3 G_4 H_3)$$

(12)



$$\frac{G_1 G_2 G_3 G_4}{1 - G_3 G_4 H_1 + G_2 G_3 H_2} \left(R - H_3 Y \right) Y$$

$$\frac{G_1 G_2 G_3 G_4}{1 - (G_3 G_4 H_1 + G_2 G_3 H_2)} \; R - \left(\frac{G_1 G_2 G_3 G_4 H_3}{1 - G_3 G_4 H_1 + G_2 G_3 H_2} + 1 \right) Y$$

$$G_1 G_2 G_3 G_4 R = \left(G_1 G_2 G_3 G_4 H_3 + 1 - G_3 G_4 H_1 + G_2 G_3 H_2 \right) Y$$

$$Y = \frac{G_1 G_2 G_3 G_4}{G_1 G_2 G_3 G_4 H_3 + G_2 G_3 H_2 - G_3 G_4 H_1 + 1} \; R$$

(13)

$$Y = AR$$

$$Y = \frac{G_1 G_2 G_3 G_4}{1 - G_3 G_4 H_1 + G_2 G_3 H_2 + G_1 G_2 G_3 G_4 H_3}$$