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1. $(I+GH)^{-1}GR$ $Y=TR$ $T=(I+GH)^{-1}G$

Por Diagrama de blocos:

$Z=Hy \rightarrow R-E=Hy \rightarrow R-G^{-1}y=Hy \rightarrow R=(G+H)y$

Com isso:

$R=(I+HG)G^{-1}y \rightarrow (I+HG)^{-1}R=G^{-1}y \rightarrow y=G(I+HG)^{-1}R$

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

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

2. $Z=Hy=HGE=HG(R-Z) = \frac{HGR}{(I+GH)}$
 $(I+HG)^{-1}HG=ZR^{-1}$

$Y=GE \rightarrow H^{-1}Z=G(R-Z) \rightarrow GR=(H^{-1}+G)Z=(I+GH)H^{-1}Z$

$ZR^{-1}=H(I+GH)^{-1}G$

$Z=Hy=HG(R-Z) \rightarrow Z=H(I+GH)^{-1}GR$ $\frac{Z}{R}=\frac{GH}{(I+GH)} = \frac{L}{I+L}$

3. $Y=GHZ \rightarrow Y=GH(A-Y)$

$Y=GHZ-YH-GHY$

$Y(I+GH)=GR$

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



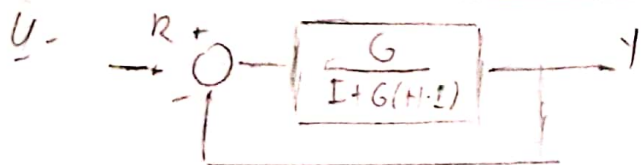
$Y=GE$

$Y=G(R-Z)$

$Y=G(R-YH)$

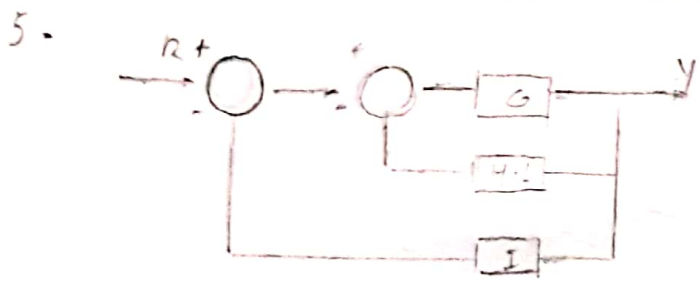
$Y(I+HG)=GR$

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



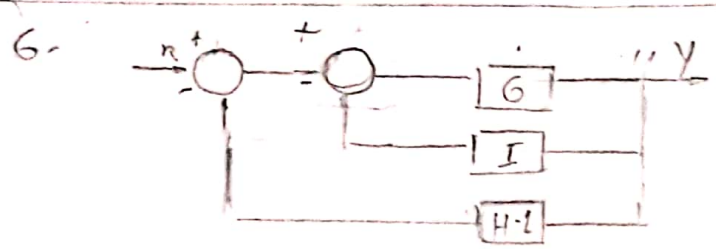
$Y=\frac{(R-Y)G}{I+G(H-1)}$

$Y=\frac{GR}{I+GH}$



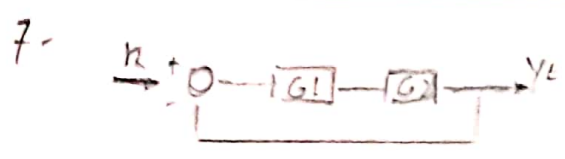
$$Y = (R - I \cdot Y)(H - 1)G$$

$$Y = \frac{GR}{1 + HG}$$



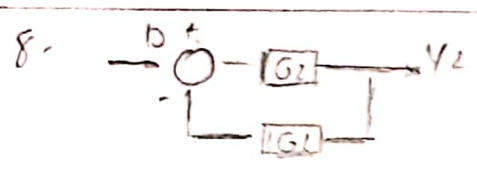
$$Y = (R - Y)(H - I - YI)G$$

$$Y = \frac{GR}{1 + GH}$$



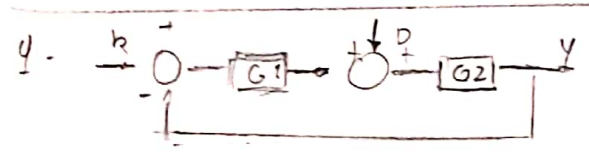
$$Y_2 = (R - Y_2)G_1G_2$$

$$Y_2 = \frac{RG_1G_2}{1 + G_1G_2}$$



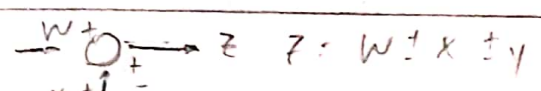
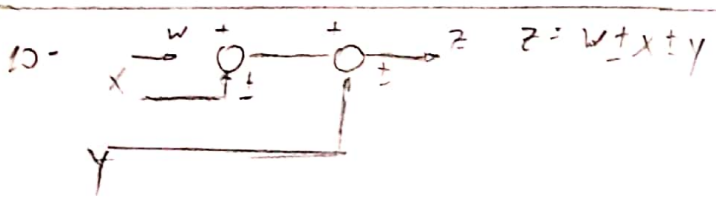
$$Y_2 = (D - Y_2G_2)G_2$$

$$Y_2 = \frac{DG_2}{1 + G_1G_2}$$

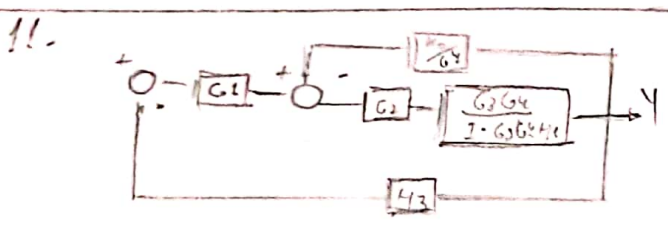


$$Y = (R \cdot Y + D)G_2$$

$$Y = \frac{R(RG_2 + D)}{1 + G_1G_2}$$

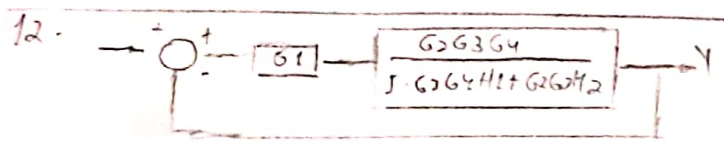


Os dois equivalentes tem mesma função



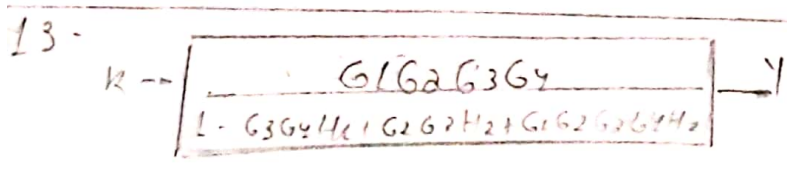
$$Y = \left[(R - H_3Y)G_2 - \frac{YH_2}{G_4} \right] G_2 - \frac{G_2G_4}{1 - G_2G_4H_2}$$

$$Y = \frac{RG_1G_2G_3G_4}{1 - H_1G_3G_4 - H_2G_2G_3 + H_3G_1G_2G_3G_4}$$



$$Y = \frac{(R - Y)G_1G_2G_3G_4}{1}$$

$$Y = \frac{RG_1G_2G_3G_4}{1 - H_1G_3G_4 + H_2G_2G_3 + H_3G_1G_2G_3G_4}$$



$$\frac{Y}{R} = \frac{G_1G_2G_3G_4}{1 - G_3G_4H_1 + G_2G_4H_2 + G_1G_2G_3G_4H_2}$$