

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

$$Y = TR$$

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

$$R - Z = Z \Rightarrow R - Z = HY$$

$$R = G^{-1} Y \cdot HY ; R = (I + G^{-1} H) Y ; R = (GH + I)^{-1} GR$$

$$R = G(I + HG)^{-1} R ; Y = TR$$

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

$$2) Z = HY = HGZ \cdot HGIR - Z ; Z = \frac{HGIR}{(I - HG)}$$

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

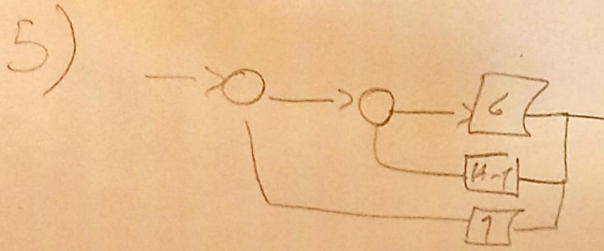
$$Y = GE, H^{-1} Z = G(R - Z), (H^{-1} - G)Z = GR;$$

$$(I + GH)H^{-1} Z = GR ; Z = H(I + GH)^{-1} GR$$

$$HG = GH = L ; \frac{Z}{R} = \frac{GH}{(I + GH)} = \frac{1}{I + L}$$

$$3) Y = \left(\frac{R}{H} - Y\right) \frac{6H}{6} \Rightarrow Y = 6R - Y6H \Rightarrow Y = \frac{6R}{1+6H}$$

$$4) Y = \frac{6}{1+6(H-1)} (R-Y) \Rightarrow Y \left(1 + \frac{6}{1+6(H-1)}\right) \Rightarrow Y = \frac{6R}{1+6H}$$



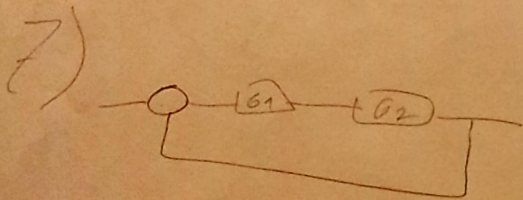
$$6((R-Y) - (H-1)Y) = Y$$

$$6(R - HY) = Y$$

$$Y(1+6H) = 6R \rightarrow Y = \frac{6R}{1+6H}$$

$$6) Y = 6(R - (H-1)Y - Y)$$

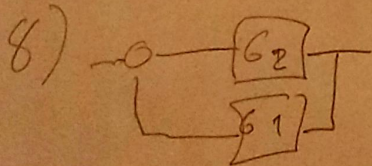
$$Y = 6(R - H) \Rightarrow Y = \frac{6R}{1+H6}$$



$$G_1(G_1(R-Y) + D) = Y$$

$$Y = G_1 G_2 (R - Y_1)$$

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



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

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

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

$$10) Z = (WIX)IY$$

$$Z = (IYIX) * W$$

$$11) A = \frac{b_2 b_3 b_4}{1 - b_1 b_2 b_3 b_4} \quad Y = A \left(\frac{R - H_1 Y}{b_4} - \frac{H_2 Y}{b_4} \right)$$

$$Y = \frac{b_1 b_2 b_3 b_4 R}{1 - b_2 b_3 b_4 + b_2 b_3 b_4 H_2 + b_1 b_2 b_3 b_4 H_1}$$

$$1 - b_2 b_3 b_4 H_1 + b_2 b_3 b_4 H_2 + b_1 b_2 b_3 b_4 H_1$$

$$12) T = \frac{b_1 b_2 b_3 b_4}{1 - b_3 b_4 H_1 + b_2 b_3 H_2}$$

$$AT = Y \quad ; \quad B = Y H_3 \quad ; \quad A = R - B = R - Y H_3 \quad ; \quad Y \left(\frac{1}{1 - H_3} \right)$$

$$Y = \frac{TR}{1 - TH_3}$$

$$13) Y = \frac{b_1 b_2 b_3 b_4 R}{1 - b_1 b_2 b_3 b_4 H_1 + b_2 b_3 b_4 H_2 + b_1 b_2 b_3 b_4 H_1}$$

$$1 - b_1 b_2 b_3 b_4 H_1 + b_2 b_3 b_4 H_2 + b_1 b_2 b_3 b_4 H_1$$