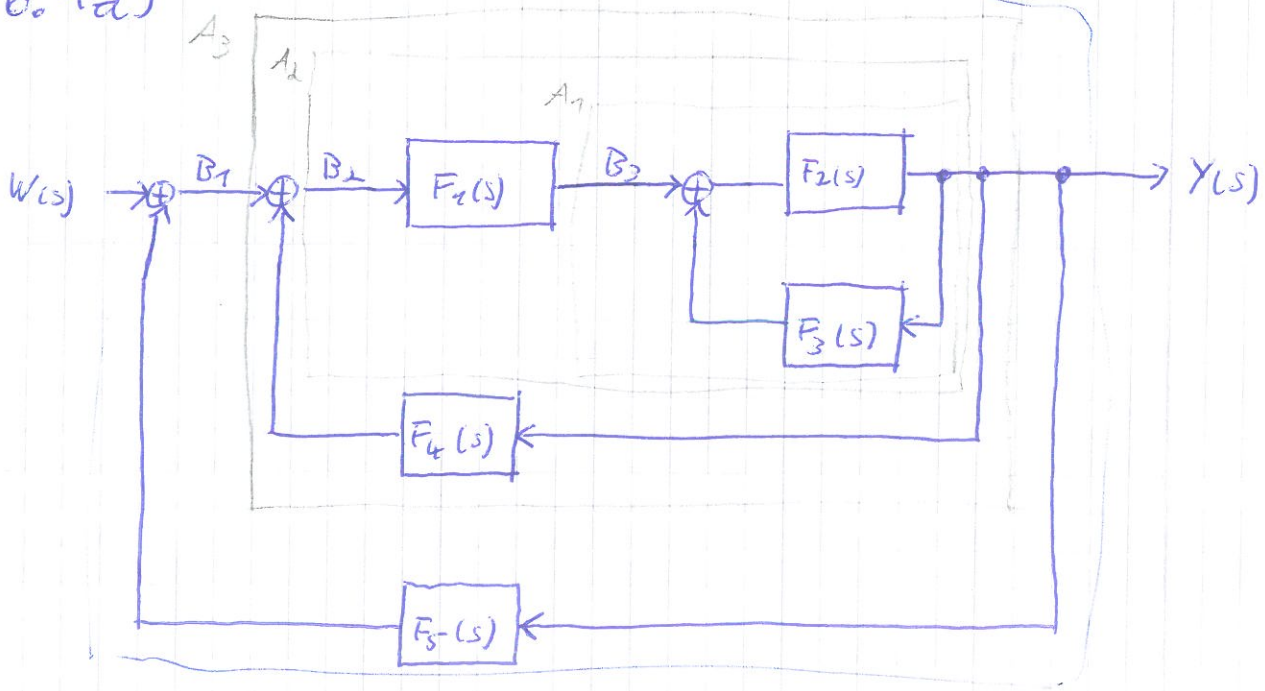
6.1a)



$$A_{1Y} = F_2 \cdot (B_3 + A_{3Y} \cdot F_3)$$

$$G_1 = \left(\frac{A_{1Y}}{B_3}\right) = \frac{F_2}{1 - F_2 \cdot F_3} \quad \surd$$

$$A_{2Y} = B_2 \cdot F_1 \cdot A_{1Y}$$

$$G_2 = \left(\frac{A_{2Y}}{B_2}\right) = F_1 \cdot A_{1Y} \surd \quad = F_1 \cdot \frac{F_2}{1 - F_2 \cdot F_3}$$

~~$F_1 \cdot G_1$~~

$$A_{3Y} = A_{2Y} \cdot (B_1 + A_{3Y} \cdot F_4)$$

$$G_3 = \left(\frac{A_{3Y}}{B_1}\right) = \frac{g_1(A_{2Y})}{1 - \underbrace{(A_{2Y} \cdot F_4)}_{g_2}} = \frac{\frac{F_1 F_2}{1 - F_2 \cdot F_3}}{1 - \frac{F_1 F_2 F_4}{1 - F_2 \cdot F_3}} = \frac{F_1 F_2}{1 - F_2 F_3} \cdot \frac{1 - F_2 F_3}{1 - F_2 F_3 - F_1 F_2 F_4}$$

$$= \frac{F_1 \cdot F_2}{1 - F_2 F_3 - F_1 F_2 F_4}$$

$$Y(s) = A_{3Y} \cdot (W(s) + Y(s) \cdot F_5)$$

$$G_4 \left(\frac{Y(s)}{W(s)}\right) = \frac{g_2(A_{3Y})}{1 - \underbrace{(A_{3Y} \cdot F_5)}_{g_3}} = \frac{\frac{F_1 F_2}{1 - F_2 F_3 - F_1 F_2 F_4}}{1 - \frac{F_1 F_2 \cdot F_5}{1 - F_2 F_3 - F_1 F_2 F_4}}$$

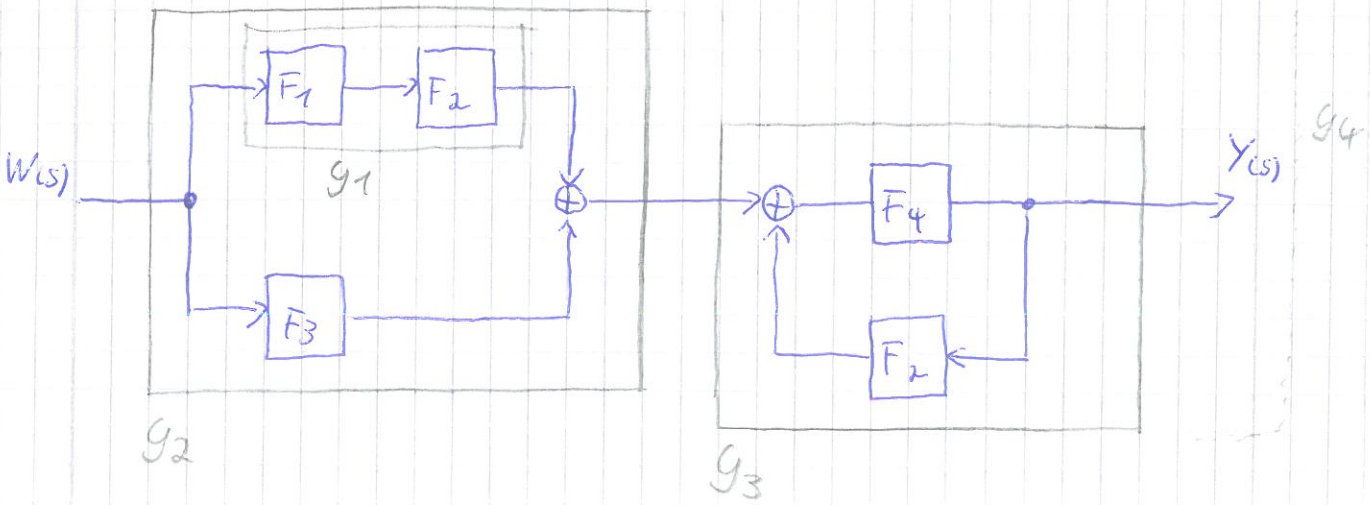
$$= \frac{F_1 F_2}{1 - F_2 F_3 - F_1 F_2 F_4} \cdot \frac{1 - F_2 F_3 - F_1 F_2 F_4}{1 - F_2 F_3 - F_1 F_2 F_4 - F_1 F_2 F_5}$$

$$= \frac{F_1 F_2}{1 - F_2 - F_3} - \frac{1}{F_4} - \frac{1}{F_5}$$

6.1 b)

$g_1 = F_1$ $\quad g_3 = F_3$

$g_2 = F_2$ $\quad g_4 = F_4$



$$A_{1Y} = F_1 \cdot F_2 \cdot W(s)$$

$$g_1 = \frac{A_{1Y}}{W(s)} = F_1 \cdot F_2$$

$$A_{2Y} = W(s) \cdot (g_1 + F_3)$$

$$g_2 = \frac{A_{2Y}}{W(s)} = g_1 + F_3$$

$$A_{3Y} = F_4 \cdot (g_2 + A_{3Y} \cdot F_2)$$

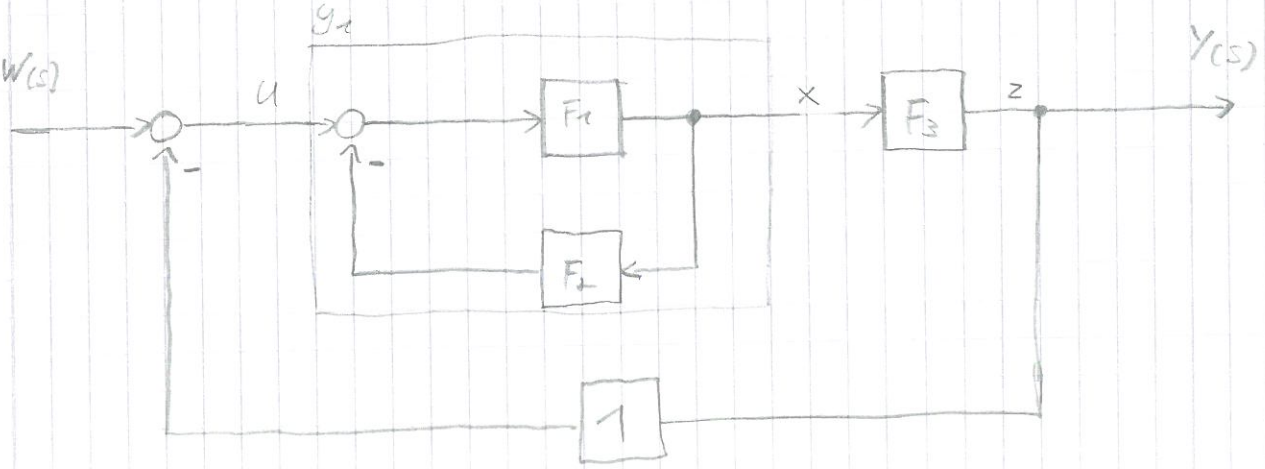
$$g_3 = \frac{A_{3Y}}{g_2} = \frac{F_4}{1 - F_4 \cdot F_2}$$

$$Y(s) = g_2 \cdot g_3$$

$$g_4 = ((F_1 \cdot F_2) + F_3) \cdot \left(\frac{F_4}{1 - F_4 \cdot F_2}\right)$$

6.1 c)

$$F_1 = \frac{10}{s+1} \qquad F_2 = 2 \qquad F_3 = \frac{1}{s}$$



$$A_{1x} = F_1 \cdot (U - A_{1x} \cdot F_2)$$

$$g_1 = \frac{A_{1x}}{U} = \frac{F_1}{1 + F_1 \cdot F_2}$$

$$x = g_z = \frac{\frac{10}{s+1}}{1 + \frac{20}{s+1}} = \frac{\frac{10}{s+1}}{\frac{s+1}{s+1} + \frac{20}{s+1}} = \frac{10}{s+1+20} = \frac{10}{s+21}$$

$$z = x \cdot F_3 = \frac{10}{s+21} \cdot \frac{1}{s} = \frac{10}{s^2+21s}$$

$$Y = \frac{z}{1 + z \cdot 1} = \frac{\frac{10}{s^2+21s}}{1 + \frac{10}{s^2+21s}} = \frac{\frac{10}{s^2+21s}}{\frac{s^2+21s+10}{s^2+21s}} = \frac{10}{s^2+21s} \cdot \frac{s^2+21s}{s^2+21s+10}$$

$$= \frac{10}{s^2+21s+10}$$