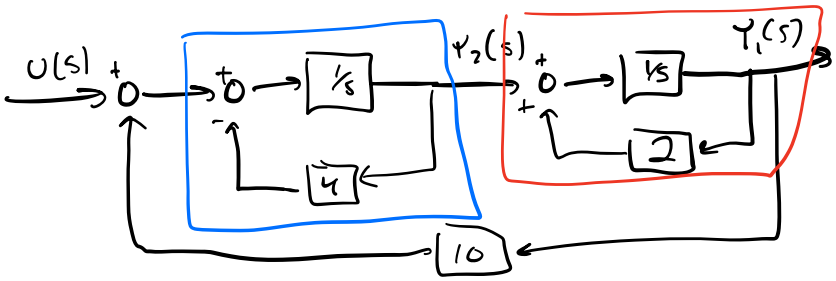
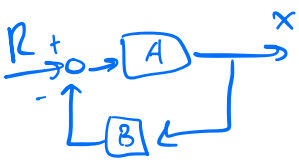
Ex. Evaluate $\frac{Y_1(s)}{U(s)}$

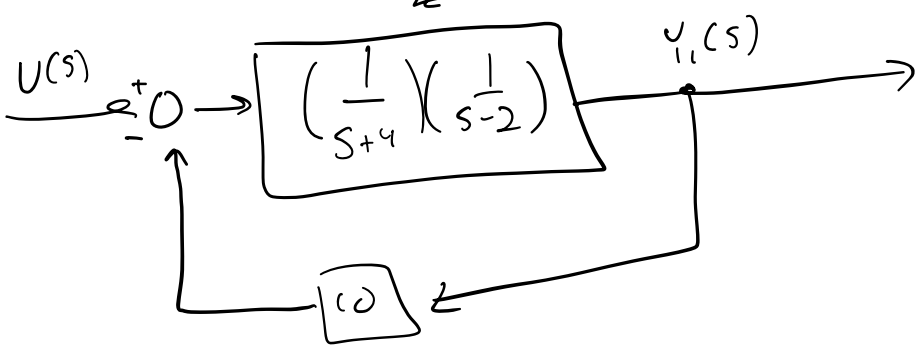




$$\frac{x}{R} = \frac{A}{1+AB}$$

$$\rightarrow \frac{Y_2(s)}{X_1(s)} = \frac{\frac{1}{s}}{4 \cdot \frac{1}{s}} = \frac{1}{s+4}$$

$$\frac{Y_1(s)}{Y_2(s)} = \frac{\frac{1}{s}}{1-2\frac{1}{s}} = \frac{1}{s-2}$$



$$\frac{Y_1(s)}{U(6)} = \frac{\frac{1}{s+4} \cdot \frac{1}{s-2}}{1 + 10 \cdot \frac{1}{s+4} \cdot \frac{1}{s-2}} = \frac{1}{s^2+2s+2}$$

EX. BLOCK DIAGRAM CONSTRUCTION

FROM F-BD : $\boxed{m\ddot{x} + c\dot{x} + kx = F}$

$$\ddot{x} = \frac{1}{m}F - \frac{c}{m}\dot{x} - \frac{k}{m}x$$