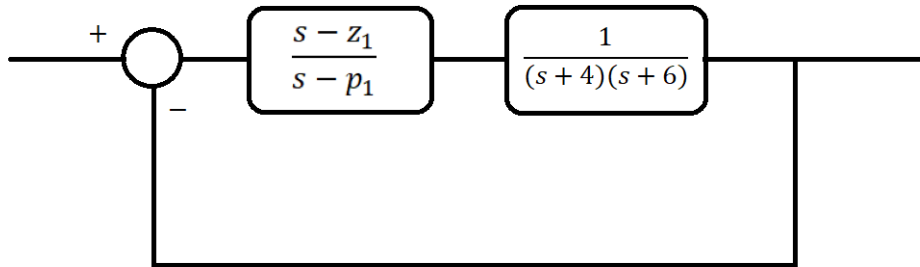
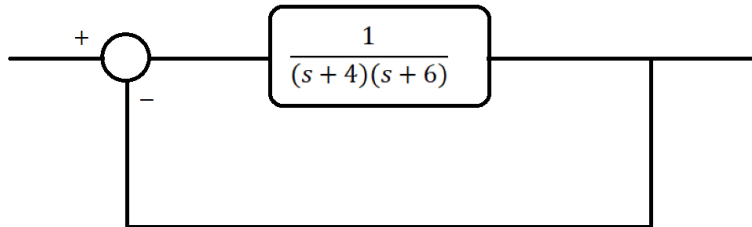


## Compensador de adelanto en el lugar de las raíces



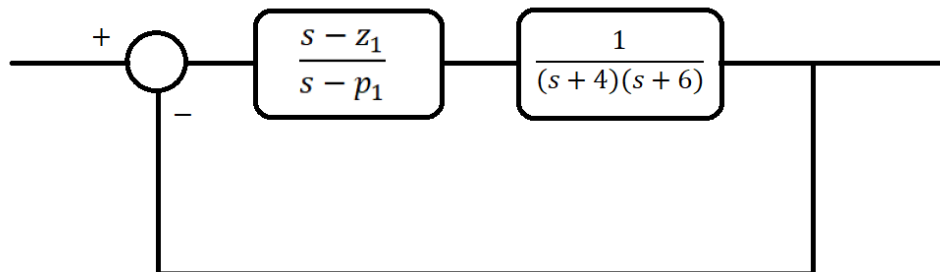
1. Error al escalón sin compensador



$$Kp = \lim_{s \rightarrow 0} s \cdot \frac{1}{(s + 4)(s + 6)} \cdot \frac{1}{s} \rightarrow \frac{1}{4 \cdot 6} \rightarrow \frac{1}{24}$$

$$e_{ss} = \frac{1}{1 + kp} = \frac{1}{1 + \frac{1}{24}} = 0,96$$

2. Proponga un compensador para que el error aumente un 20%



$$kp = \lim_{s \rightarrow 0} s \cdot \frac{(s - z_1)}{(s - p_1)(s + 4)(s + 6)} \cdot \frac{1}{s} \rightarrow \frac{z_1}{24p_1}$$

$$e_{ss} = \frac{1}{1 + kp} = \frac{1}{1 + \frac{z_1}{24p_1}} = 1,152$$

$$\frac{z_1}{24p_1} = x$$

$$\frac{1}{1 + x} = 0,774 \rightarrow x = -0,1319$$

$$z_1 = -0,13194 \cdot 24p_1 \rightarrow \frac{z_1}{p_1} = -3,1665$$

$$z_1 = -3,1665 \quad p_1 = 1$$

$$e_{ss} = \frac{1}{1 + \frac{1}{-3,1665}} = 1,4615$$

