

3 d)

$$G(s) = \frac{s+5}{(s+10)^2}$$

$$K = 0$$

$$\frac{5 \left(\frac{s}{10} + 1 \right)}{10^2 \left(\frac{s}{10} + 1 \right) \left(\frac{s}{10} + 1 \right)}$$

$$(s+10)(s+10) = s^2 + 20s + 100$$

$$\frac{5}{10^2} \cdot \frac{\left(\frac{s}{10} + 1 \right)}{\left(\frac{s}{10} + 1 \right)^2}$$

$$K_B$$

$$K = \frac{5}{100}$$

$$\omega_n = 10$$

$$\xi = 1$$

critico amortecido

$$\frac{(s+10)(s+10)}{s^2 + 20s + 100}$$

$$\frac{1}{s^n} = \frac{t^{n-1}}{(n-1)!}$$

$$R(s) = \frac{1}{s}$$

$$Y(s) = R(s) \cdot G(s)$$

$$= \frac{1}{s} \cdot \frac{s+5}{(s+10)(s+10)}$$

$$= \frac{A}{s} + \frac{B}{(s+10)^2} + \frac{C}{(s+10)}$$

$$A = \frac{s+5}{s(s+10)(s+10)} \cdot s \Big|_{s=0} = \frac{5}{100}$$

$$B = \frac{s+5}{s(s+10)^2} (s+10)^2 \Big|_{s=-10} = \frac{-5}{-10} = \frac{1}{2}$$

$$[x^n]' = n x^{n-1}$$

$$s^{-1} = -\frac{1}{s^2}$$

caso especial

$$C = \frac{d}{ds} \left\{ \frac{s+5}{s} \right\} \Big|_{s=-10} = \frac{d}{ds} \left\{ 1 + \frac{5}{s} \right\} = \frac{d}{ds} \frac{5}{s}$$

$$= 5 \cdot \frac{d}{ds} \frac{1}{s}$$

$$Y(s) = \frac{\frac{1}{20}}{s} + \frac{\frac{1}{2}}{(s+10)^2} - \frac{\frac{1}{20}}{s+10}$$

$$= -5 \cdot \frac{1}{s^2} \Big|_{s=-10}$$

$$= -5 \cdot \frac{1}{100}$$

$$= -\frac{1}{20}$$

$$= \frac{1}{20} u(t) - \frac{1}{20} e^{-10t} + \frac{1}{2} \cdot \frac{1}{s^2}$$

$$+ \frac{1}{2} \cdot \frac{t^{2-1}}{2-1} \cdot e^{-10t}$$

$$+ \frac{1}{2} t e^{-10t}$$

