Transformada de Laplace

01 ⇒ $\frac{s^3 + 17}{s(s^2 + 10s + 34)}$

$$X(s) = \frac{A}{s} + \frac{B(s+5)}{(s+5)^2 + 9} + \frac{3C}{(s+5)^2 + 9}$$

$$A(s^2 + 10s + 34) + B(s^2 + 5s) + 3Cs = s^3 + 17$$

- $A = 1/2 \Rightarrow B = -1/2 \Rightarrow C = -1/2$

$$X(s) = \frac{1/2}{s} - \frac{1/2(s+5)}{(s+5)^2 + 3^2} - \frac{3/2}{(s+5)^2 + 3^2}$$

$$x(t) = \left[\frac{1}{2} - \frac{1}{2}\left(e^{-5t}\cos(3t)\right) - \frac{1}{2}\left(e^{-5t}\operatorname{sen}(3t)\right)\right] u(t)$$

02)

$$(D^2+8D+7)\,y(t) = (D+2)\,x(t)$$

$$s^2 Y(s) - s\,y(0^-) - y'(0^-) + 8\left(s\,Y(s) - y(0^-)\right) + 7\,Y(s)$$

$$= sX(s) + 2X(s)$$

$$Y(s)\left[s^2+8s+7\right] = \frac{s+2}{s}$$

$$Y(s) = \frac{s+2}{s(s^2+8s+7)}$$

$$\frac{A}{s} + \frac{B(s+4)}{(s+4)^2-9} - \frac{3C}{(s+4)^2-9}$$

$$\frac{A}{s} + \frac{B(s+4)}{(s+4)^2 - 9} - \frac{3C}{(s+4)^2 - 9}$$

$$A(s^2 + 8s + 7) + B(s^2 + 4s) - 3Cs = s + 2$$

$$\boxed{A = \frac{2}{7}} \quad \boxed{B = \frac{-2}{7}} \quad \boxed{C = \frac{1}{7}}$$

$$X(s) = \frac{2/7}{s} - \frac{2/7\,(s+4)}{(s+4)^2 - 3^2} - \frac{3/7}{(s+4)^2 - 3^2}$$

$$x(t) = \left[\frac{2}{7} - \frac{2\left(e^{-4t}\cos(-3t)\right)}{7} - 3\left[\frac{e^{-4t}\sin(-3t)}{7}\right]\right] u(t)$$

05 ~~20~~ $\dfrac{s^2 + 2s + 5}{s^2 + 8s + 9}$

$$\frac{\frac{s^2}{s^2} + \frac{2s}{s^2} + \frac{5}{s^2}}{\frac{s^2}{s^2} + \frac{8s}{s^2} + \frac{9}{s^2}} \Rightarrow \frac{1 + \frac{2}{s} + \frac{5}{s^2}}{1 + \frac{8}{s} + \frac{9}{s^2}}$$