$$y''(t) + 2y'(t) + y(t) = t\,u(t) \qquad y(0) = -1, \quad y'(0) = 0$$

$$s^2Y(s) - sy(0) - y'(0) + 2(sY(s) - y(0)) + Y(s) = \frac{1}{s^2}$$

$$\underbrace{(s^2 + 2s + 1)}_{(s+1)^2} Y(s) = -s - 2 + \frac{1}{s^2} = -\frac{s^3 - 2s^2 + 1}{s^2}$$

$s = -1$ racine

$$Y(s) = \frac{-s^3 + 2s^2 + 1}{s^2(s+1)^2} = \frac{(s+1)(-s^2 - s + 1)}{s^2(s+1)^2}$$

$$= \frac{A}{s} + \frac{B}{s^2} + \frac{C}{s+1} = -\frac{(s^2 + s - 1)}{s^2(s+1)}$$

$$C = -\left(\frac{s^2 + s - 1}{s^2}\right)\Big|_{s=-1} = \frac{-(1 - 1 - 1)}{1} = 1$$

$$B = -\left(\frac{s^2 + s - 1}{s+1}\right)\Big|_{s=0} = 1$$

Termes en s^{-2} : $A + C = -1$

$$A = -1 - C = -2$$

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

$$\boxed{y(t) = (-2 + t + e^{-t})\,u(t)}$$