TRANSFORMADA DE LAPLACE.

$$y_P = 2e^{2t} + 4\cos(3t) - 3\,\text{sen}(3t) +$$
$$+ t\cos(3t) - 2\,t\,\text{sen}(2t).$$

$$y_H = C_1 e^{2t} + C_2\cos(3t) + C_3\,\text{sen}(3t)$$

$$y_{P/NH} = t\cos(3t) - 2t\,\text{sen}(2t)$$

$$(D-2)(D^2+9)y = 0 \qquad (D^3 - 2D^2 + 9D - 18)y = 0$$

$$Dy_P = \cos(3t) - 3t\,\text{sen}(3t) - 2\,\text{sen}(3t) - 4t\cos(3t)$$

$$D^2 y_P = -3\,\text{sen}(3t) - 3\,\text{sen}(3t) - 9t\cos(3t) -$$
$$- 6\cos(3t) - 4\cos(3t) + 12t\,\text{sen}(3t)$$

$$D^2 y_P = -6\,\text{sen}(3t) - 9t\cos(3t) - 10\cos(3t) + 12t\,\text{sen}(3t)$$

$$D^3 y_P = -18\cos(3t) - 9\cos(3t) + 27t\,\text{sen}(3t) +$$
$$+ 30\,\text{sen}(3t) + 12\,\text{sen}(3t) + 36t\cos(3t).$$

$$= -27\cos(3t) + 27t\,\text{sen}(3t) + 42\,\text{sen}(3t) + 36t\cos(3t)$$

$$D^3 y_p \iff -27\cos(3t) + 27t\,\text{sen}(3t) + 42\,\text{sen}(3t) + 36t\cos(3t)$$

$$+ \quad -2D^2 y_p \iff 20\cos(3t) - 24t\,\text{sen}(3t) + 12\,\text{sen}(3t) + 18t\cos(3t)$$

$$+ \quad 9D y_p \iff 9\cos(3t) - 27t\,\text{sen}(3t) - 18\,\text{sen}(3t) - 36t\cos(3t)$$
$$+ 36t\,\text{sen}(3t) \qquad\qquad -18t\cos(3t)$$

$$-18 y_p \iff$$

$$\underline{\qquad\qquad\qquad}$$

$$Q \Rightarrow$$

$$\frac{d^3 y}{dt^3} - 2\frac{d^2 y}{dt^2} + 9\frac{dy}{dt} - 18y = 6\cos(3t) + 48\,\text{sen}(3t)$$

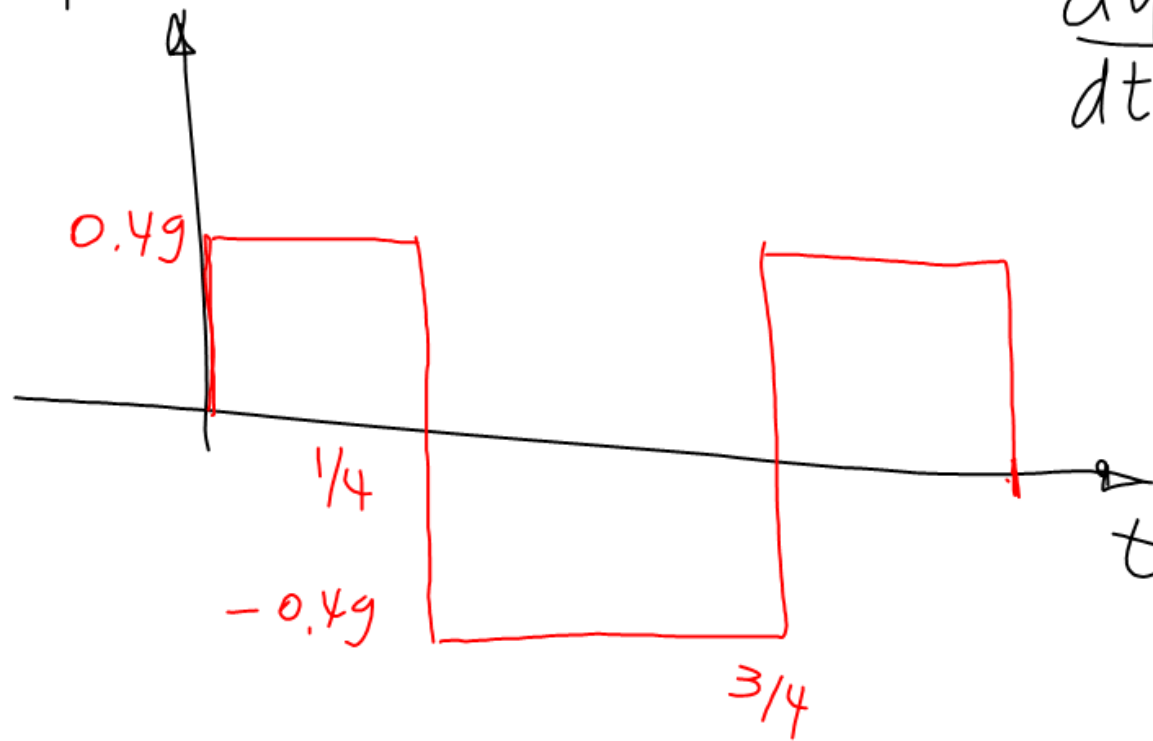$$empuje \rightarrow \frac{d^3 y}{dt^3} \Rightarrow \frac{d}{dt}\left(\frac{d^2 y}{dt^2}\right) \leq 1.6 \; ft/s^3$$

$$y(t_f) = 225$$

$$y'(t_f) = 0$$

$$y''(t_f) = 0$$

225 m

$0.49 \; \dfrac{m}{s^3}$

$y = 0 \quad y' = 0 \quad y'' = 0$

Empuje

$$\frac{d^3 y}{dt^3} = Empuje \cdot (t)$$

0.49

1/4

−0.49

3/4

t