5.10

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$$Y = \mathcal{L}(y)$$

$$\mathcal{L}(y') = sY \qquad \mathcal{L}(y'') = s^2 Y$$

$$\mathcal{L}(y''') = s^3 Y$$

$$y''' + 3y'' + 3y' + y = \delta(t) \iff s^3Y + 3s^2Y + 3sY + Y = 1 \iff$$

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

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

$$\underline{y(t) = \tfrac{1}{2} \cdot t^2 e^{-t} \theta(t)} \qquad -\infty < t < +\infty$$