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$$= \frac{-4s}{8s\sqrt{s^2+1}(s-\sqrt{s^2+1})} (-s+\sqrt{s^2+1} \quad -s+\sqrt{s^2+1})$$

$$= \frac{-4s}{8s\sqrt{s^2+1}(s-\sqrt{s^2+1})} \times -2(s-\sqrt{s^2+1})$$

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

7/7 ie $L(J_0(t)) = \dfrac{1}{\sqrt{s^2+1}}$

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3) $L\left(\dfrac{d^2y}{dt^2}\right) = s^2Y - sy(0) - y'(0) =$

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Eq. becomes

$$s^2Y - 3s + 1 + 4Y = L(f)$$

$$Y(s^2+4) + 1 - 3s = L(f)$$

$$Y = \frac{3s-1}{4+s^2} + \frac{L(f)}{4+s^2}$$

$$y = L^{-1}\left(\frac{3s-1}{4+s^2}\right) + L^{-1}\left(\frac{L(f)}{4+s^2}\right)$$

$$= 3L^{-1}\left(\frac{s}{4+s^2}\right) - L^{-1}\left(\frac{1}{4+s^2}\right) + L^{-1}\left(L(f)\,L(\tfrac{1}{2}\sin 2t)\right)$$

$$= 3\cos 2t - \frac{1}{2}\sin 2t + \frac{1}{2}\int_0^t f(\tau)\sin 2(t-\tau)\,d\tau$$

when $t = 0$

$$y = 3\times 1 - 0 + 0 = 3$$

$$\frac{dy}{dt} = -6\sin 2t - \cos 2t + 2^{-1}\left(f(t)\sin(2(t-t))\right.$$

$$\left. - 0 + 2\int_0^t f(\tau)\cos 2(t-\tau)\,d\tau\right)$$

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$$\frac{dy}{dt}(t=0) = -1 + \frac{1}{2}(0 - 0 + 0) = -1$$

You have verified the initial condns. are satisfied but NOT checked the ode. PTO