

Trevon Fraser

First Order Linear (Webwork Prob 6)

$$y' + y = 2 \sin(-5t)$$

$$\frac{dy}{dt} + y = 2 \sin(-5t)$$

$$p(t) = 1 \quad q(t) = 2 \sin(-5t)$$

$$e^{\int p(t) dt} = e^{\int 1 dt} = e^t$$

$$ye^t = \int 2 \sin(-5t) e^t dt$$

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$$\int e^{at} \sin(bt) dt = \frac{e^{at}}{a^2 + b^2} (a \sin(bt) - b \cos(bt))$$

$$ye^t = 2 \left[\frac{e^t}{(1^2) + (-5^2)} (\sin(-5t) - (-5) \cos(-5t)) \right]$$

$$y = 2e^{-t} \left[\frac{e^t}{26} (\sin(-5t) - (-5) \cos(-5t)) + C \right]$$