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1. Find the solutions to $y' - 3y = e^t$.
2. Find the particular solution which has $y(0) = 1$.

1. $p = -3$ and $q = e^t$ in $y' + py = q$ (standard form)

so we let $u = e^{\int p} = e^{\int -3} = e^{-3t}$

and then $y = \frac{1}{u} \int uq = e^{3t} \int e^{-3t} e^t dt = e^{3t} \int e^{-2t} dt$

$$y = e^{3t} \left(-\frac{1}{2} e^{-2t} + C \right)$$

$$\boxed{y = -\frac{1}{2} e^t + C e^{3t}}$$

2. If $y(0) = 1$ then $1 = -\frac{1}{2} e^0 + C e^0 = -\frac{1}{2} + C$

so $C = \frac{3}{2}$. Thus

$$\boxed{y = -\frac{1}{2} e^t + \frac{3}{2} e^{3t}}$$