WRITE YOUR NAME:

MAC 2302 Quiz 6
Thursday September 19th

Solve the linear differential equation by first finding an integrating factor.

$$y' - y = e^{7x}$$

$$y' + (-1)\underbrace{y}_{} = e^{7x} \quad \underbrace{}_{}$$

$\underbrace{}_{P(x)} \quad \underbrace{\phantom{e^{7x}}}_{Q(x)}$

Has the form $y' + P(x)y = Q(x)$
We know an integrating factor
will be $e^{\int P(x)dx}$

$P(x) = -1 \Rightarrow \int P(x)dx = -x \Rightarrow \mu(x) = e^{\int P(x)dx} = e^{-x}$

Multiply both sides of the DE by $\mu(x) = e^{-x}$
(we know the left side will then be the derivative of $\mu \cdot y$)

$$\underbrace{e^{-x}}_{\mu(x)} y' + \underbrace{(-1)e^{-x}}_{\mu'(x)} y = e^{7x}e^{-x} = e^{6x}$$

$$(e^{-x}y)' = e^{6x}$$

$$e^{-x}y = \int e^{6x}dx = \frac{1}{6}e^{6x} + C$$

$\downarrow$ multiply by e^x

$$y = \frac{1}{6}e^{7x} + Ce^x$$