Problem 11

$y' = y + e^x$, $y = (x+c)e^x$, $y(0) = \frac{1}{2}$

(ODE) $\frac{dy}{dx} = y + e^x$

$$\frac{dy}{dx} = (x+c)\frac{d}{dx}(e^x) + e^x \frac{d}{dx}(x+c) = (x+c)e^x + e^x(1+0)$$

$$= y + e^x$$

$$\begin{cases} \frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx} \\ \frac{d}{dx}(e^x) = e^x \end{cases}$$

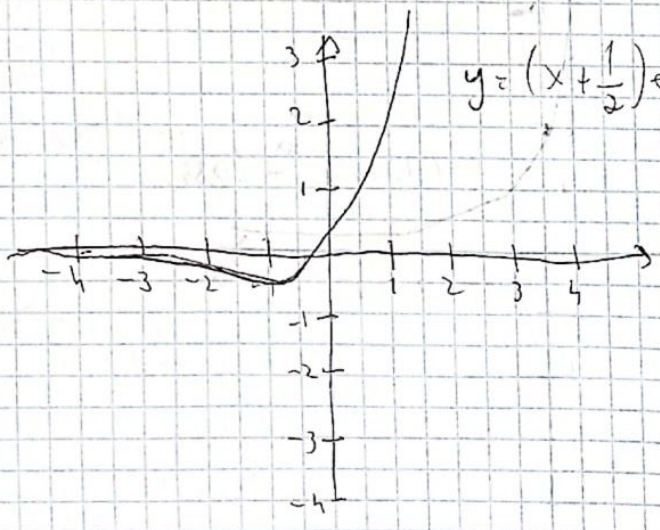
Verified ↘

$\frac{1}{2} = (0+c)e^0$

$\boxed{c = \frac{1}{2}}$

$\begin{cases} y = (x+c)e^x \end{cases}$

$\frac{dy}{dx} = y + e^x$; $y(0) = \frac{1}{2}$ $\quad y = \left(x + \frac{1}{2}\right)e^x$



Problem 9

$y' + 4y = 1.4 \quad y = ce^{-4x} + 0.35 \quad y(0) = 2$

$y' + 4y = \frac{d}{dx}(ce^{-4x} + 0.35) + 4(ce^{-4x} + 0.35) = -4ce^{-4x} + 0 + 4ce^{-4x} + 4(0.35)$

$= -4ce^{-4x} + 4ce^{-4x} + 1.4 = 1.4$

$y' + 4y = 1.4$

$y(x) = ce^{-4x} + 0.35$ and $y(0) = 2$

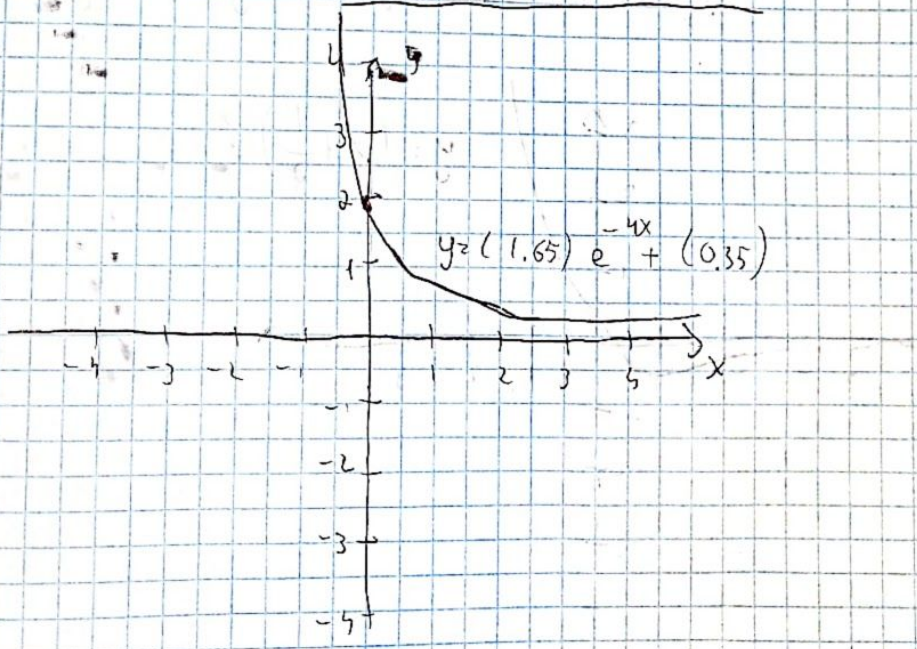
$y(0) = ce^{-4 \cdot 0} + 0.35$

$2 = ce^{0} + 0.35$

$c = 1.65$

$y(x) = (1.65)e^{-4x} + (0.35)$

Graph



Thank you

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