7te Mathe HÜ am 22.10.2023

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1) $y' = y \quad \frac{dy}{dx} = y \quad \frac{dy}{y} = dx \cdot \int \frac{1}{y} dy = \int 1 dx$

$\ln|y| = x + C \quad |e^{\square} \quad \underline{\underline{y_h(x) = e^x \cdot C}}$

$e^{\ln(x)} = x$

2) $x \cdot y' + y = 0$

$x \cdot \frac{dy}{dx} + y = 0 \quad |-y| \cdot dx \quad x \cdot dy = -y \cdot dx \; |:x \; |:y$

$\frac{dy}{y} = -\frac{dx}{x} \Rightarrow \int \frac{1}{y} dy = -\int \frac{1}{x} dx$

$\ln(|y|) = \ln(|x^{-1}|) + C \quad |e^{\square}$

$y_h(x) = e^{\ln(\frac{1}{x}) + C} \quad = \underline{\underline{y_h(x) = \frac{1}{x} \cdot C}}$

3) $2x \cdot y' + y = 0$

$2 \cdot x \cdot \frac{dy}{dx} + y = 0 \quad |-y| \cdot dx \; |:y \; |:2x$

$\frac{dy}{y} = -\frac{dx}{2x} \Rightarrow \int \frac{1}{y} dy = -\int \frac{1}{2x} dx$

$\ln(|y|) = -\frac{1}{2} \ln(|\frac{1}{x}|) + C \quad |e^{\square}$

$y_h(x) = e^{\ln(\frac{1}{x}^{-\frac{1}{2}}) + C} \quad = \underline{\underline{y_h(x) = \frac{1}{\sqrt{x}} \cdot C}}$

4) $y' + \frac{y}{x+1} = 0$

$\frac{dy}{dx} = -\frac{y}{x+1} \quad |\cdot dx \; |\cdot (x+1) \; |:y \; |:(x+1) \Rightarrow \frac{dy}{y} = -\frac{dx}{(x+1)}$

$\int \frac{1}{y} dy = -\int \frac{1}{x+1} dx \quad \ln(|y|) = \ln(|(x+1)^{-1}|) + C \quad |e^{\square}$

$y_h(x) = e^{\ln(\frac{1}{x+1}) + C} \quad = \underline{\underline{y_h(x) = \frac{C}{x+1}}}$

5) $2x \cdot y' + y = 0 \quad 2x \cdot \frac{dy}{dx} + y = 0 \quad |-y| \cdot dx \; |:y \; |\cdot 2x$

$\Rightarrow \frac{dy}{y} = -\frac{dx}{2x} \quad \int \frac{1}{y} dy = -\int \frac{1}{2x} dx \Rightarrow$

$\ln(|y|) = \ln\left(\left|\left(\frac{1}{x}\right)^{\frac{1}{2}}\right|\right) + C \quad |e^{\square}$

$y_h(x) = e^{\ln(|\frac{1}{\sqrt{x}}|) + C} \quad = y_h(x) = \frac{1}{\sqrt{x}} \cdot C$

$= \underline{\underline{y_h(x) = \frac{C}{\sqrt{x}}}}$