Tugas Kalkulus Sesi 9

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1

$$\frac{y'}{2x} = \frac{1}{2x+1}$$

- $\frac{\frac{dy}{dx}}{2x} = \frac{1}{x^2+1}$

- $\frac{1}{2x}\frac{dy}{dx} = \frac{1}{x^2+1}$

- $\frac{\frac{dy}{dx}}{2x}(x^2+1) = 2x \cdot 1$

- $\frac{dy}{dx} = \frac{2x}{x^2+1}$

- $dy = \frac{2x}{x^2+1}dx$

- $\int dy = \int \frac{2x}{x^2+1}dx$

- $y + C_1 = \int \frac{2x}{x^2+1}dx$

- $y + C_1 = \ln(|x^2+1|) + C_2$

- $y = \ln(|x^2+1|) + C$

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2. • $(1+x^2)\,dy - xy\,dx = 0$

• $(1+x^2)\,dy = xy\,dx$

• $\frac{1}{(1+x^2)y}(1+x^2)\,dy = \frac{1}{(1+x^2)y}(xy)\,dx$

• $\frac{1}{y}\,dy = \frac{1}{(1+x^2)y}(xy)\,dx$

• $\frac{1}{y}\,dy = \frac{1}{y(1+x^2)}(yx)\,dx$

• $\frac{1}{y}\,dy = \frac{1}{1+x^2}\,x\,dx$

• $\frac{1}{y}\,dy = \frac{x}{1+x^2}\,dx$

• $\int \frac{1}{y}\,dy = \int \frac{x}{1+x^2}\,dx$

• $\ln|y| + C_1 = \int \frac{x}{1+x^2}\,dx$

• $\ln|y| + C_1 = \frac{1}{2}\ln(|1+x^2|) + C_2$

• $\ln|y| = \frac{1}{2}\ln(|1+x^2|) + C$

• $\ln|y| = \frac{\ln(|1+x^2|)}{2} + C$

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

• $\ln|y| \cdot \frac{2}{2} - \frac{\ln(|1+x^2|)}{2} = C$

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

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2. • $\ln\left(\frac{y}{|1+x^2|^{\frac{1}{2}}}\right) = C$

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

• $\frac{y}{|1+x^2|^{\frac{1}{2}}} = e^{C}$

• $y = e^{C}|1+x^2|^{\frac{1}{2}}$

• $y = C|1+x^2|^{\frac{1}{2}}$

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3 $y' - \frac{x}{y} = 0, \quad y(2) = 0$

$\Rightarrow \frac{dy}{dx} = \frac{x}{y}$

- $y\frac{dy}{dx} = y\frac{x}{y}$
- $y\frac{dy}{dx} = x$
- $y\,dy = x\,dx$
- $\int y\,dy = \int x\,dx$
- $\frac{1}{2}y^2 + C_1 = \int x\,dx$
- $\frac{1}{2}y^2 + C_1 = \frac{1}{2}x^2 + C_2$
- $\frac{1}{2}y^2 = \frac{1}{2}x^2 + k$
- $2\left(\frac{1}{2}y^2\right) = 2\left(\frac{1}{2}x^2 + k\right)$
- $y^2 = x^2 + 2k$
- $y = \pm\sqrt{x^2 + 2k}$
- $y = \sqrt{x^2 + 2k}$

$y = -\sqrt{x^2 + 2k}$

$\Rightarrow 0 = \sqrt{2^2 + k} \quad \leftarrow \quad y(2) = 0$

$\sqrt{2^2 + k} = 0$

$\sqrt{2^2 + k}^2 = 0^2$

$4 + k = 0$

$k = -4$

$\Rightarrow k = -4$

- $y = \sqrt{x^2 - 4}$
- $y = \sqrt{x^2 - 2^2}$
- $y = \sqrt{(x+2)(x-2)}$

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4 $y' + x^2 y = 0, \quad y(1) = 1$

⇒ • $e^{\int x^2 dx}$

• $e^{\frac{1}{3}x^3 + C}$

• $e^{\frac{1}{3}x^3}$

• $e^{\frac{x^3}{3}}$

⇒ • $e^{\frac{x^3}{3}} \frac{dy}{dx} + e^{\frac{x^3}{3}}(x^2 y) = e^{\frac{x^3}{3}} \cdot 0$

• $e^{\frac{x^3}{3}} \frac{dy}{dx} + x^2 y e^{\frac{x^3}{3}} = 0$

• $\int \frac{d}{dx}\left[e^{\frac{x^3}{3}} y\right] dx = \int 0 \, dx$

• $e^{\frac{x^3}{3}} y = \int 0 \, dx$

• $e^{\frac{x^3}{3}} y = C$

• $\frac{e^{\frac{x^3}{3}}}{e^{\frac{x^3}{3}}} y = \frac{C}{e^{\frac{x^3}{3}}}$

• $y = \frac{C}{e^{\frac{x^3}{3}}}$

⇒ • $1 = \frac{C}{e^{\frac{1}{3}}}$

• $\frac{C}{e^{\frac{1}{3}}} = 1$

• $e^{\frac{1}{3}} \cdot \frac{C}{e^{\frac{1}{3}}} = e^{\frac{1}{3}} \cdot 1$

• $C = e^{\frac{1}{3}}$

⇒ • $y = \frac{e^{\frac{1}{3}}}{e^{\frac{x^3}{3}}}$

• $y = \frac{e^{\frac{x^3}{3}} e^{\frac{1}{3} - \frac{x^3}{3}}}{e^{\frac{x^3}{3}}}$

$y = e^{\frac{1}{3} - \frac{x^3}{3}}$ //

$y = e^{\frac{1}{3} - \frac{x^3}{3}}$ //

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