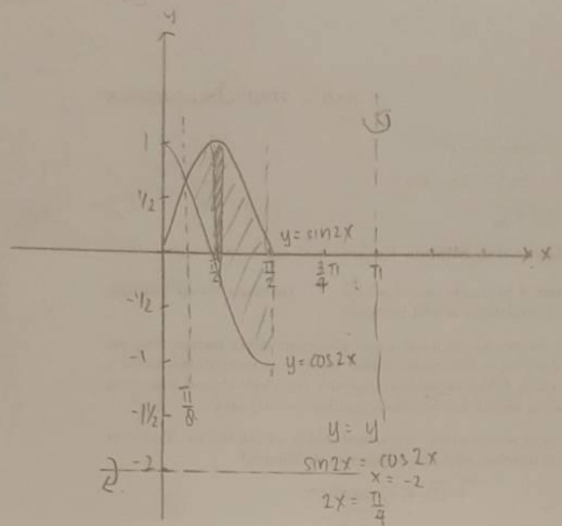
KUNCI JAWABAN DETECT KALKULUS 1

$y = \cos\left(\frac{y}{2}\right) \quad y' = ?$

$2e^{2x} \sin 3y + e^{2x} \cos 3y \ldots$

luas volume dari kurva yang dibatasi oleh $y = \sin 2x$ dan $y = \cos 2x$ dan batas $\pi/8$ sampai $\pi/2$ diputar terhadap $y = -2$.



$y = y$

$\sin 2x = \cos 2x \quad x = -2$

$2x = \frac{\pi}{4}$

$x = \frac{\pi}{8}$

diputar terhadap $y = -2$.

teorema cincin

$$V = \pi \int_{\frac{\pi}{8}}^{\frac{\pi}{2}} \left[(\sin 2x + 2)^2 - (\cos 2x + 2)^2\right] dx.$$

$$V = \pi \int_{\frac{\pi}{8}}^{\frac{\pi}{2}} \left[\sin^2 2x + 4\sin 2x + \cancel{4} - \cos^2 2x - 4\cos 2x - \cancel{4}\right] dx$$

$$V = \pi \int_{\frac{\pi}{8}}^{\frac{\pi}{2}} \left[\sin^2 2x - \cos^2 2x + 4\sin 2x - 4\cos 2x\right] dx$$

$$V = \pi \int_{\frac{\pi}{8}}^{\frac{\pi}{2}} \left[\cos 4x + 4\sin 2x - 4\cos 2x\right] dx$$

$$V = \pi \left[\sin 4x \, \frac{1}{4} - 4\cos 2x \, \frac{1}{2} - 4\sin 2x \, \frac{1}{2}\right]_{\frac{\pi}{8}}^{\frac{\pi}{2}}$$

$$V = \pi \left[\frac{1}{4}\sin 4x - 2\cos 2x - 2\sin 2x\right]_{\frac{\pi}{8}}^{\frac{\pi}{2}}$$

$$V = \pi \left[\left(\frac{1}{4}\sin\frac{\pi}{4} - 2\cos\frac{\pi}{2} - 2\sin\frac{\pi}{2}\right) - \left(\frac{1}{4}\sin 2\pi - 2\cos\pi - 2\sin\pi\right)\right]$$

$$V = \pi \left[\left(\frac{1}{4}\,\frac{1}{2}\sqrt{2} - 0 - 2\right) - \left(\frac{1}{4} - 0 - 2\right)\right]$$

$$V = \pi \left[\frac{1}{8}\sqrt{2} - \cancel{2} - \frac{1}{4} + \cancel{2}\right]$$

$$V = \pi \, \frac{\sqrt{2} - 8}{8} \sqrt{2} \text{ SV}$$

//

$\sin xy + xy^2 + x^2y = 1$

$\cos xy \cdot y + \cos xy \cdot y' + y^2 + 2xy \cdot y' + 2xy + x^2y' = 0$

$y\cos xy + y'\cos xy + y^2 + y'2xy + 2xy + x^2y' = 0$

$y'(\cos xy + 2xy + x^2) + y\cos xy + y^2 + 2xy = 0$

$$y' = \frac{-y\cos xy - y^2 - 2xy}{\cos xy + 2xy + x^2}$$

1.b. $\int x\cos x\,dx \longrightarrow \int u\,dv = uv - \int v\,du$

$u = x \qquad v = \sin x$

$du = dx \qquad dv = \cos x\,dx$

$= x\sin x - \int \sin x\,dx$

$= x\sin x + \cos x + c$ //

$\int \sin 2x\,(4\cos^2 x + 2\sin^2 x)^{1/2}\,dx$

$= \int 2\sin x\cos x\,(2\cos^2 x + (2\cos^2 x + \sin^2 x))^{1/2}\,dx$

$= \int \cancel{2}\sin x\cos x\,(2\cos^2 x + 2)^{1/2}\,\dfrac{d(2\cos^2 x + 2)}{-\cancel{2}\sin 2x}$

$= -\int \dfrac{\cancel{\sin 2x}}{\cancel{\sin 2x}}\,(2\cos^2 x + 2)^{1/2}\,d(2\cos^2 x + 2)$

$= -\frac{2}{3}(2\cos^2 x + 2)^{3/2} + c$ //

$y = \ln\cos x$

$y' = \dfrac{(\cos x)'}{\cos x} = \dfrac{-\sin x}{\cos x} = -\tan x$ //

$$y = \cancel{\ln e^{x}} \cdot e^{2x}$$

$$y = x \cdot e^{2x}$$

$$y' = x' e^{2x} + x\left(e^{2x}\right)'$$

$$y' = e^{2x} + 2xe^{2x}$$

C. $\int \cos x \, e^{x} \, dx$

$u = \cos x \qquad v = e^{x}$

$du = -\sin x \, dx \qquad dv = e^{x} dx$

$= e^{x} \cos x + \int e^{x} \sin x \, dx$

$u = \sin x \qquad v = e^{x}$

$du = \cos x \, dx \qquad dv = e^{x} dx$

$$\int e^{x} \cos x \, dx = e^{x} \cos x + e^{x} \sin x - \int e^{x} \cos x \, dx$$

$$2\int e^{x} \cos x \, dx = e^{x} \cos x + e^{x} \sin x$$

$$\int e^{x} \cos x \, dx = \frac{e^{x} \cos x + e^{x} \sin x}{2} + c$$

$x' \rightarrow$ $0 = y\,dx + x\,dy + \sin x\,dx + dy + e^{x} dx - e^{y} dy \;:\; dy$

$$0 = y \cdot x' + x + \sin x \cdot x' + 1 + e^{x} \cdot x' - e^{y}$$

$$x'(-y - \sin x - e^{x}) = x + 1 - e^{y}$$

$$x' = \frac{x + 1 - e^{y}}{(-y - \sin x - e^{x})}$$

$$x' = \frac{e^{y} - x - 1}{e^{x} + \sin x + y}$$

$y' \rightarrow$ $0 = y\,dx + x\,dy + \sin x\,dx + dy + e^{x} dx - e^{y} dy \;:\; dx$

$$0 = y + x \cdot y' + \sin x + y' + e^{x} - e^{y} \cdot y'$$

$$y'(-x - 1 + e^{y}) = y + \sin x + e^{x}$$

$$y' = \frac{e^{x} + \sin x + y}{e^{y} - x - 1}$$

No

Date

Soal ++

$$\int \underset{\Downarrow \atop dv}{x^{\alpha}} \, (\underset{\Downarrow \atop u}{\ln^2 x}) \, dx \Rightarrow$$

misal $u = \ln^2 x$, $du = 2 \ln x \, \frac{1}{x} \, dx$

$dv = x^{\alpha}$, $v = \frac{x^{(\alpha+1)}}{\alpha+1}$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - \int \frac{x^{(\alpha+1)}}{\alpha+1} \cdot 2 \ln x \, \frac{1}{x} \, dx$$

misal

$t = \ln x \Rightarrow t = {}^{e}\log x \Rightarrow x = e^{t}$

$dt = \frac{1}{x} \, dx$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - \int \frac{e^{t(\alpha+1)}}{\alpha+1} \cdot 2t \cdot \frac{1}{\cancel{x}} \cdot \cancel{x} \, dt$$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - \int \frac{e^{t(\alpha+1)}}{\alpha+1} \cdot 2t \, dt$$

$$\ln^2 x \cdot \frac{x^{\alpha+1}}{\alpha+1} - \frac{2}{\alpha+1} \int \underset{\Downarrow \atop db}{e^{t(\alpha+1)}} \cdot \underset{\Downarrow \atop a}{t} \, dt$$

misal, $a = t$

$da = dt$

$db = e^{t(\alpha+1)} \, dt$

$b = \frac{e^{t(\alpha+1)}}{\alpha+1}$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - \frac{2}{\alpha+1} \left(t \cdot \frac{e^{t(\alpha+1)}}{\alpha+1} - \int \frac{e^{t(\alpha+1)}}{\alpha+1} \, dt \right)$$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - 2 \, \frac{e^{t(\alpha+1)}}{(\alpha+1)^2} \cdot t - \frac{2}{\alpha+1} \cdot \left(- \int \frac{e^{t(\alpha+1)}}{\alpha+1} \, dt \right)$$

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - 2 \, \frac{e^{t(\alpha+1)}}{(\alpha+1)^2} \cdot t + 2 \, \frac{e^{t(\alpha+1)}}{(\alpha+1)^3} + C$$

$\Rightarrow e^{t} = x$

Jadi

$$\ln^2 x \cdot \frac{x^{(\alpha+1)}}{\alpha+1} - 2 \, \frac{x^{(\alpha+1)}}{(\alpha+1)^2} \cdot \ln x + 2 \, \frac{x^{(\alpha+1)}}{(\alpha+1)^3} + C$$