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Date

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1. $\int_2^0 \frac{3}{x}\,dx \Rightarrow \lim_{R\to\infty} \int_2^R \frac{3}{x}\,dx$

$= \lim_{R\to\infty} 3\ln|x| \Big]_2^R$

$= \lim_{R\to\infty} 3(\ln R - \ln 2) = \infty$ Divergen

36. $\int_1^\infty \frac{\ln x}{x}\,dx \Rightarrow \lim_{R\to\infty} \int_1^R u\,du = \frac{x^2}{2}\Big]_1^R$

$= \lim_{R\to\infty} \frac{R^2}{2} - \frac{1}{2} = \infty$ Divergen

9. $\int_0^\infty \frac{1}{(x-2)^2}\,dx \Rightarrow \lim_{R\to\infty} \int_2^R \frac{1}{u^2}\,du = -\frac{1}{x-2}\Big]_0^R$

$= \lim_{R\to\infty} \frac{-1}{\infty} - \left(\frac{-1}{-2}\right) = -2$ konvergen

11. $\int_0^\infty \cos x\,dx \Rightarrow \lim_{R\to\infty} \int_0^R \cos x\,dx$

$= \lim_{R\to\infty} \sin x \Big]_0^R = \sin R - \sin 0 \Rightarrow \infty$ Divergen

27. $\int_1^\infty e^x\,dx \Rightarrow \lim_{R\to\infty} \int_1^2 e^x\,dx$

$= \lim_{R\to\infty} e^x \Big]_1^R = \lim_{R\to\infty} e^R - e^1 = e^\infty - e = \infty$ Divergen

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1. $\int_{-\infty}^{-1} \frac{3}{x}\,dx \Rightarrow \lim_{R \to -\infty} \int_{R}^{-1} \frac{3}{x}\,dx$

terdef pada $(-\infty, -1]$ $= \lim_{R \to -\infty} 3 \ln|x| \Big]_R^{-1}$

$= 3(\ln|-1| - \ln|-\infty|) = 3(\ln|1|) - \ln(-\infty) = -\infty$ Divergen

5. $\int_{-\infty}^{-1} x e^{-x^2}\,dx \Rightarrow \lim_{R \to \infty} \int_{R}^{-1} x e^{-x^2}\,dx =$

$= \lim_{R \to \infty} \int_{R}^{-1} \frac{x}{e^{x^2}}\,dx$

$= \lim_{R \to \infty} \frac{1}{2} \int_{R}^{-1} \frac{1}{e^{u}}\,du$

$= \lim_{R \to \infty} \frac{1}{2} e^{-x^2} \Big]_{\infty}^{-1}$

$= \lim_{R \to \infty} \frac{1}{2}\left(\frac{1}{e^1} - \frac{1}{e^{\infty}}\right) = \frac{1}{2}\left(\frac{1}{e} - \frac{1}{e^{\infty}}\right) = \frac{1}{2e}$ konvergen

6. $\int_{-\infty}^{0} \frac{dx}{(2x-1)^3} \Rightarrow \lim_{R \to -\infty} \int_{R}^{0} \frac{dx}{(2x-1)^3}$

$= \lim_{R \to -\infty} \frac{-1}{4(2x-1)^2} \Big]_R^0 = \frac{-1}{4(0-1)^2} - \left(-\frac{1}{4(2R-1)^2}\right)$

$= -\frac{1}{4} - \left(-\frac{1}{2(\infty)^2}\right) = -\frac{1}{4}$ konvergen

8. $\int_{-\infty}^{0} e^{3x}\,dx \Rightarrow \lim_{R \to -\infty} \int_{R}^{0} e^{3x}\,dx = \frac{1}{3} \int_{R}^{0} e^{u}\,du$

$= \lim_{R \to -\infty} \frac{1}{3} e^{3x} \Big]_{-\infty}^{0} = \frac{1}{3}(e^0 - e^{-\infty}) = \frac{1}{3}(1-0) = \frac{1}{3}$ konvergen

9. $\int_{-\infty}^{1} \frac{dx}{(2-x)^2} \Rightarrow \lim_{R \to -\infty} \int_{R}^{1} \frac{dx}{(2-x)^2} = -\int_{R}^{1} \frac{1}{(u)^2} = -\left(-\frac{1}{u}\right)\Big]_R^1 = \left(\frac{1}{2-x}\right)\Big]_R^1$

$= \lim_{R \to -\infty} \frac{1}{2-1} - \frac{1}{2-(-\infty)} = 1 - 0 = 1$ konvergen

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2. $$\int_{-\infty}^{\infty} \frac{1}{x^2}\,dx \Rightarrow \int_{-\infty}^{0} \frac{dx}{x^2} + \int_{0}^{\infty} \frac{dx}{x^2}$$

$$\lim_{R\to-\infty} \int_{R}^{0} \frac{dx}{x^2} = \frac{-1}{x}\Big]_{R}^{0} = -\frac{1}{0} - \left(-\frac{1}{R}\right) = -\infty \text{ Divergen}$$

karena $\int_{-\infty}^{0} \frac{dx}{x^2}$ divergen, maka $\int_{-\infty}^{\infty} \frac{1}{x^2}\,dx$ divergen

5. $$\int_{-\infty}^{\infty} e^{3x}\,dx = \int_{-\infty}^{0} e^{3x}\,dx + \int_{0}^{\infty} e^{3x}\,dx$$

$$\lim_{R\to\infty} \int_{0}^{\infty} e^{3x}\,dx = \frac{1}{3} e^{3x}\Big]_{0}^{\infty} = \frac{1}{3}\left(e^{\infty} - e^{0}\right) = \infty \text{ Divergen}$$

karena $\int_{0}^{\infty} e^{3x}\,dx$ divergen, maka $\int_{-\infty}^{\infty} e^{3x}\,dx$ divergen

6. $$\int_{-\infty}^{\infty} \frac{1}{1+x^2}\,dx = \int_{-\infty}^{0} \frac{1}{1+x^2}\,dx + \int_{0}^{\infty} \frac{1}{1+x^2}\,dx$$

$$\lim_{R\to-\infty} \int_{R}^{0} \frac{1}{1+x^2}\,dx = \arctan(x)\Big]_{R}^{0} = \arctan(0) - \arctan(-\infty) = -(-1{,}57$$

$$= 1{,}57\ldots$$

$$\int_{-\infty}^{\infty} \frac{1}{1+x^2}\,dx = 1{,}57 + 1{,}57 = 3{,}14 \text{ Konvergen}$$

10. $$\int_{-\infty}^{\infty} \frac{x}{\sqrt{x^2+4}}\,dx \Rightarrow \lim_{R\to\infty} \int_{R} \frac{x}{\sqrt{x^2+4}}\,dx = \frac{1}{2}\int \frac{du}{\sqrt{u}} = \frac{1}{2}\, 2\sqrt{u} = \sqrt{x^2+4}\Big]$$

$$= \lim_{R\to\infty} \sqrt{4} - \sqrt{-\infty+4} = -\infty \text{ Divergen}$$

karena $\int_{-\infty}^{0} \frac{x}{\sqrt{x^2+4}}\,dx$ divergen, maka $\int_{-\infty}^{\infty} \frac{x}{\sqrt{x^2+4}}$ divergen

13. $$\int_{-\infty}^{\infty} \frac{x}{(x^2+4)^2}\,dx \Rightarrow \int_{-\infty}^{0} \frac{x}{(x^2+4)^2}\,dx + \int_{0}^{\infty} \frac{x}{(x^2+4)^2}\,dx$$

$$\lim_{R\to-\infty} \int_{R}^{0} \frac{x}{(x^2+4)^2}\,dx = \frac{1}{2}\int_{R}^{0} \frac{du}{(u)^2} = -\frac{1}{2x}\Big]_{R}^{0} = -\frac{1}{0} - \left(-\frac{1}{2(-\infty)}\right) = -\infty$$

karena $\int_{-\infty}^{0} \frac{x}{(x^2+4)^2}\,dx$ divergen, maka $\int_{-\infty}^{\infty} \frac{x}{(x^2+4)^2}\,dx$ divergen