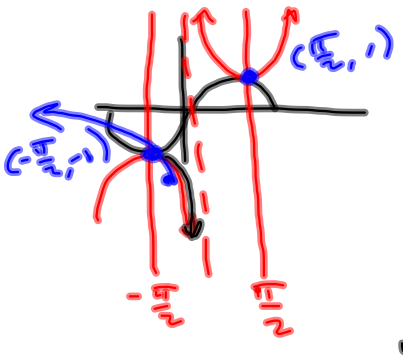
$\lim_{x\to -\infty} \csc^{-1}(x) = 0$ by stupid graph

Think of where $\csc x \longrightarrow -\infty$?



Best answer

6b $\boxed{\lim_{x\to\infty}\left(1+\frac{4}{x}\right)^{\frac{4}{3x}} = 1^0 = 1}$

Should've done a 1^∞ sitch, with $\left(1+\frac{4}{x}\right)^{\frac{4x}{3}}$

$$y = \left(1+\frac{4}{x}\right)^{\frac{4}{3x}}$$

$$\ln y = \ln\left(\left(1+\frac{4}{x}\right)^{\frac{4}{3x}}\right)$$ work Hard way

$$= \frac{4}{3x}\ln\left(1+\frac{4}{x}\right) \xrightarrow{x\to\infty} 0\cdot 0 = 0$$

Dumb way

$$e^{\lim_{x\to\infty}\ln y} = e^0 \longrightarrow$$

$$\lim_{x\to\infty} y = e^0 = 1$$

$$= \frac{\ln\left(1+\frac{4}{x}\right)}{\frac{3x}{4}} \xrightarrow{x\to\infty} \frac{0}{\infty}$$

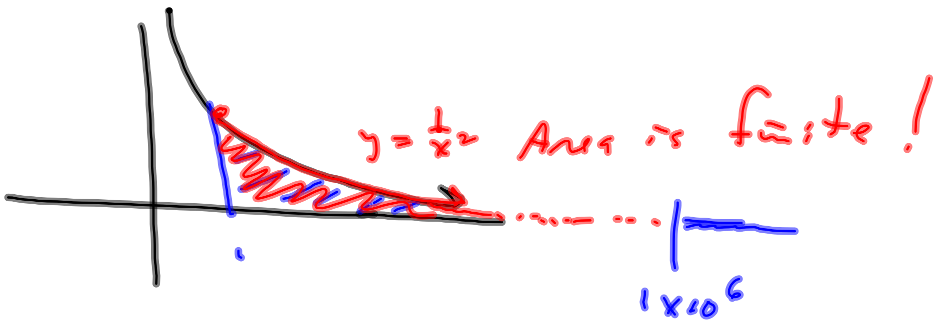
Dumb A**

§8.7

$$\int_1^\infty \frac{dx}{x^2} = \lim_{t\to\infty} \int_1^t \frac{dx}{x^2}$$

$$\lim_{t\to\infty}\left(\left.\frac{x^{-1}}{-1}\right]_1^t \right) = \lim_{t\to\infty} \left(-\frac{1}{x}\right)_1^t$$

$$= \lim_{t\to\infty} \left(-\frac{1}{t} - \left(-\frac{1}{1}\right)\right) = \lim_{t\to\infty} \left(1 - \frac{1}{t}\right) = 1$$



Let $\varepsilon > 0$ be given

Then $\exists\ \delta > 0$ so that $|x - a| < \delta \Rightarrow$

$|f(x) - L| < \varepsilon$

Then $\exists\ M > 0$ so that

$$\left| \int_1^N f - \int_1^\infty f \right| < \varepsilon \text{ for } N > M$$

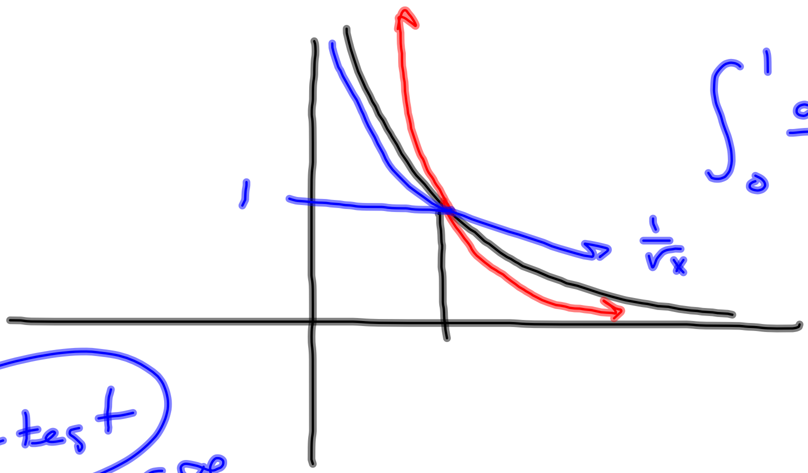
$$\int_1^\infty \frac{dx}{x} = \lim_{t\to\infty}(\ln t - \ln 1)$$

$$= \lim_{t\to\infty} \ln t \;\cancel{\longrightarrow}\; \cancel{\exists}\; \infty$$

Does not converge.

$$\int_1^\infty \frac{dx}{x^{1.1}} = \lim_{t\to\infty} \left.\frac{x^{-.1}}{-.1}\right]_1^t = \lim_{t\to\infty} -10\left[\frac{1}{x^{.1}}\right]_1^t$$

$$= \lim_{t\to\infty}\left(-10\left[\frac{1}{t^{.1}} - \frac{1}{1^{.1}}\right]\right) = \lim_{t\to\infty}\left(10\left[1 - \frac{1}{t^{0.1}}\right]\right) = 10$$



$$\int_0^1 \frac{dx}{x^2}$$

P-test

$$\int_1^\infty \frac{dx}{x^p} \text{ converges for } p > 1$$
$$\text{Diverges for } p \le 1$$

$$\sum_{n=1}^\infty \frac{1}{n^p} \text{ works the same way.}$$

$$\sum_{n=1}^\infty \frac{1}{n^2} \text{ converges}$$

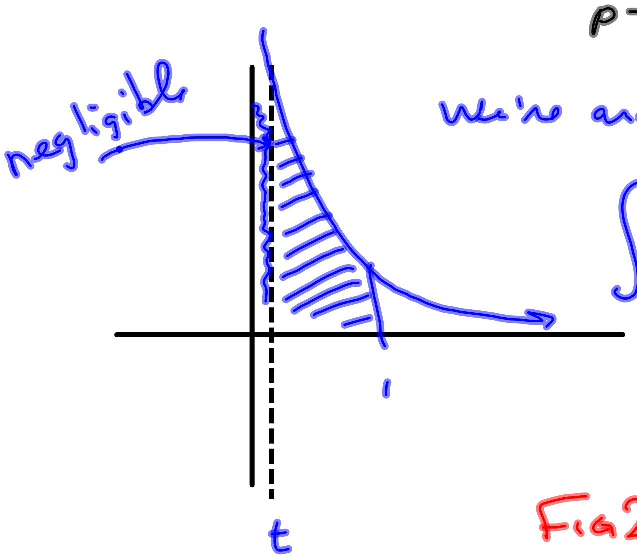
$$\sum_{n=1}^\infty \frac{1}{n} \text{ doesn't.}$$

$$\int_0^1 \frac{dx}{\sqrt{x}} = \int_0^1 x^{-\frac{1}{2}}\,dx = \lim_{t\to 0}\int_t^1 x^{-\frac{1}{2}}\,dx$$

$$= \lim_{t\to 0} 2x^{\frac{1}{2}}\Big]_t^1 = \lim_{t\to 0}\left[2\cdot 1^{\frac{1}{2}} - 2\cdot t^{\frac{1}{2}}\right] = 2$$

$\displaystyle\int_0^1 \frac{dx}{x^p}$ converges for $0 < p < 1$

The flip side of the p-test.



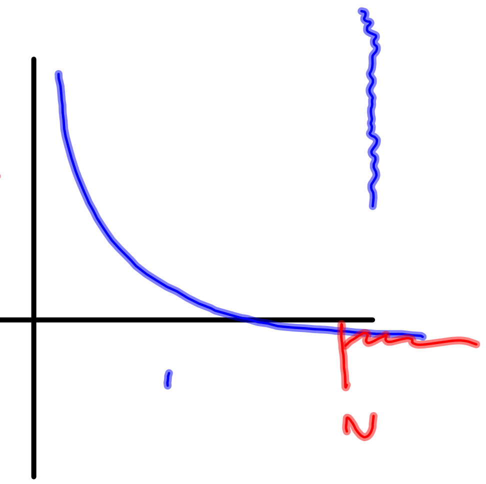
we're arguing that $\displaystyle\int_0^t \frac{dx}{x^p}$ is negligible.

for $0 < p < 1$

for sufficiently small t

Fig 2 $\displaystyle\int_N^\infty \frac{dx}{x^p}$ is negligible for sufficiently large N

Fig 2



$\int_1^\infty \frac{dx}{1+x^2}$ compares favorably with $\int_1^\infty \frac{dx}{x^2}$

Comparison

$0 < \frac{1}{x^2+1} < \frac{1}{x^2}$ & $\int_1^\infty \frac{dx}{x^2}$ converges.

§8.7 Look @ / work

some odds 64 Mon.

$$\frac{59}{90} = \frac{x}{100}$$

$$x = 100\left(\frac{59}{90}\right)$$

66

85 - 100
70 - 84
50 - 69

$$\frac{10}{9}(59)$$

$$9\overline{)590} = 65.\overline{5}$$
54
50

(85, 90), (100, 100)

(70, 80), (84, 89)

(50, 70) (69, 79)

$$y = \frac{9}{14}(x-50)+70$$