

Homework

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Notes

Finding the limit of $\frac{\tan x}{x}$

Fact

$$\lim_{x \rightarrow 0} \frac{\sin x}{x} = 1$$

Example

(Note that simple substitution will result in division by zero.)

$$\begin{aligned} \lim_{x \rightarrow 0} \frac{\tan x}{x} &= \lim_{x \rightarrow 0} \left(\frac{\sin x}{x} \cdot \frac{1}{\cos x} \right) \\ &= \lim_{x \rightarrow 0} \frac{\sin x}{x} \cdot \lim_{x \rightarrow 0} \frac{1}{\cos x} \\ &= 1 \cdot \frac{1}{1} \\ &= 1 \end{aligned}$$

Notes

Finding the limit as x goes to 2 of $\frac{x^3-1}{x-2}$

Example

- Want to calculate $\lim_{x \rightarrow 2} \frac{x^3-1}{x-2}$.
- Substitution won't work. (Why?)
- Let's graph it. Notice the suggestion of an asymptote on the calculator.
- Let's use a more sophisticated graphing program (winplot), and try again.
- Notice that on the left the function dives downwards, and on the right jumps upwards. This suggests that the limit does not exist.
- Official Answer: There is no limit.

Notes

Homework

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