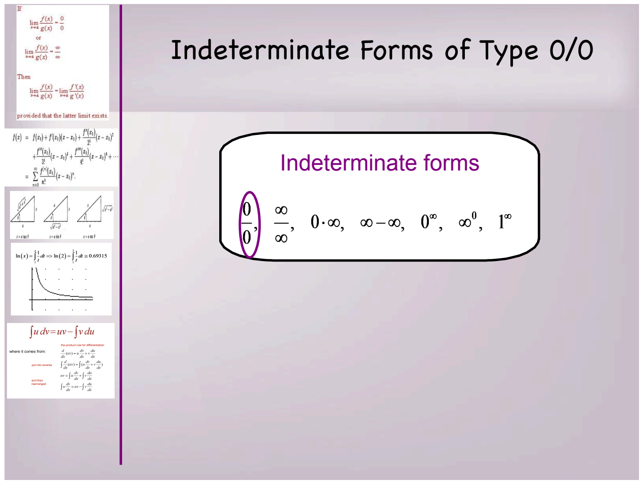

Previously we found the limit of an expression which appeared to approach $\frac{0}{0}$.

Determine this limit. $\lim_{x\to 2}\frac{x^2-2x}{x^2+3x-10}$

We also were able to geometrically determine this limit. $\lim_{x\to 0}\frac{\sin x}{x}$

L'Hopital's Rule:

If $\lim_{x\to a} f(x) = \lim_{x\to a} g(x) = 0$ and $\lim_{x\to a} \frac{f'(x)}{g'(x)}$ exists

(either finite or ±∞), then $\lim_{x\to a} \frac{f(x)}{g(x)} = \lim_{x\to a} \frac{f'(x)}{g'(x)}$.

This makes both of the previous problems more simple.

EX 1 Determine these limits using the rule above.

a) $\lim_{x\to 2} \frac{x^2 - 2x}{x^2 + 3x - 10}$

b) $\lim_{x\to 0} \frac{\sin x}{x}$

EX 2 $\lim_{x\to 0} \frac{e^x - e^{-x}}{2\sin x}$

EX 3 $\lim_{x\to 0^+} \frac{7^{\sqrt{x}} - 1}{2^{\sqrt{x}} - 1}$

EX 4 $\lim_{x \to 0} \frac{\sin x - \tan x}{x^2 \sin x}$

EX 5 $\lim_{x \to 0} \frac{\cos x}{x}$

EX 6 $\lim_{x \to 0^+} \frac{\int_0^x \sqrt{t} \cos t \, dt}{x^2}$

EX 7 $\lim_{x \to 0^-} \frac{\sin x + \tan x}{e^x + e^{-x} - 2}$