L'Hopital's Rule

Warm-up: Find the following limits.

1. $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{x - 1}$

2. $\lim\limits_{x \to \infty} \dfrac{1}{x}$

3. $\lim\limits_{x \to +\infty} e^x$

L'Hopital's Rule for Form 0/0

Steps for Applying L'Hopital's Rule

1. _____

2. _____

3. _____

Examples

1. $\lim\limits_{x \to 1} \dfrac{x^2 - 1}{x - 1}$

2. $\lim\limits_{x \to 0} \dfrac{\sin 2x}{x}$

3. $\lim\limits_{x \to 0} \dfrac{e^x - 1}{x^3}$

Practice Problems

1. $\lim\limits_{x \to 2} \dfrac{x^2 - 4}{x - 2}$

2. $\lim\limits_{x \to \pi/2} \dfrac{1 - \sin x}{\cos x}$

3. $\lim\limits_{x \to 0^-} \dfrac{\tan x}{x^2}$

L'Hopital's Rule

Example 4: $\displaystyle\lim_{x\to 0}\frac{1-\cos x}{x^2}$

L'Hopital's Rule for Forms ∞/∞

Example 5: $\displaystyle\lim_{x\to +\infty}\frac{x}{e^x}$