L'Hopital's Rule

Back to Limits

- There were some limits we couldn't solve
- Like 0/0 or inf/inf
- Now that we learned derivatives we can go back and solve these

$$\lim_{x \to 0} \frac{\sin(x)}{x} \qquad \lim_{x \to 0} \frac{e^x - 1}{x}$$

L'Hopital's Rule

$$\lim_{x \to a} \frac{f(x)}{g(x)} = \lim_{x \to a} \frac{f'(x)}{g'(x)}$$

- If

$\lim_{x \to a} f(x) = 0$ and $\lim_{x \to a} g(x) = 0$ or

$\lim_{x \to a} f(x) = \pm\infty$ and $\lim_{x \to a} g(x) = \pm\infty$

Examples

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

$$\lim_{x\to 0}\frac{e^{x}-1}{x}$$

$$\lim_{x\to\infty}\frac{e^{x}}{x^{n}}$$

$$\lim_{x\to 0}\frac{\sin(x)}{1-\cos(x)}$$

$$\lim_{x\to 0}\left(1-2\mathrm{x}\right)^{1/x}$$

$$\lim_{x\to\infty} e^{-x^{2}}x^{3}$$

$$\lim_{n\to\infty} P\left(1+\frac{r}{n}\right)^{nt}$$

$$\lim_{x\to\infty} x^{x^{2}}$$

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

Questions?