

## 4-4: L'HOSPITAL'S RULE

1. Compare the following two limits:

$$(a) \lim_{x \rightarrow 4} \frac{2x^2 - 5x - 12}{x^2 - 3x - 4} =$$

$$(b) \lim_{x \rightarrow 4} \frac{\ln(x - 3)}{4x - x^2} =$$

2. L'Hospital's Rule

3. (Some routine examples.) Evaluate the limits.

$$(a) \lim_{x \rightarrow (\pi/2)^+} \frac{\cos x}{1 - \sin x}$$

$$(b) \lim_{x \rightarrow \infty} \frac{\ln \sqrt{x}}{x^2}$$

$$(c) \lim_{x \rightarrow 5^+} \frac{e^x - 1}{x - 5}$$

$$(d) \lim_{x \rightarrow \infty} \frac{e^x}{x^2}$$

4. L'Hospital's Rule can address other indeterminate forms.

5. Examples to demonstrate.

(a)  $\lim_{x \rightarrow 0^+} x \ln x$

(b)  $\lim_{x \rightarrow \infty} \left(1 + \frac{a}{x}\right)^{bx}$

6. Examples for you.

(a)  $\lim_{x \rightarrow 1^+} x^{\frac{1}{1-x}}$

(b)  $\lim_{x \rightarrow \infty} x^{3/2} \sin\left(\frac{1}{x}\right)$

(c)  $\lim_{x \rightarrow 0^+} \left(\frac{1}{x} - \frac{1}{e^x - 1}\right)$