

Section 4.5: Indeterminate Forms and l'Hospital's Rule

These notes reflect material from our text, *Calculus, Concepts and Contexts, Third Edition*, by James Stewart, published by Brooks/Cole, Pacific Grove, CA, 2005.

Key points from Stewart, Section 4.5: Indeterminate Forms and l'Hospital's Rule.

Concepts

Indeterminate forms of several types: $\frac{0}{0}$, $\frac{\infty}{\infty}$, $0 \cdot 0$, and $\infty - \infty$

L'Hospital's Rule

Indeterminate powers: 0^0 , ∞^0 , 1^∞

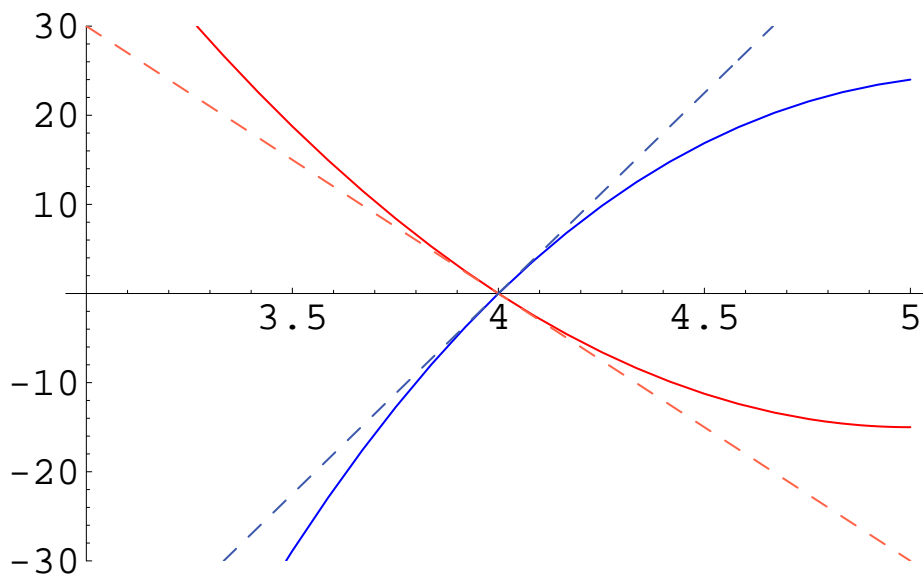


Fig. l'Hospital's Rule.

Analyse des Infiniment Petits, 1696

(*Stewart, 4.6.55*) In the first calculus textbook ever written, the author used the result that has since taken on his name, l'Hospital's Rule, to calculate the following limit (shown here in modern notation):

$$\lim_{x \rightarrow a} \frac{\sqrt{2a^3x - x^4} - a\sqrt[3]{a^2x}}{a - \sqrt[4]{ax^3}}$$

Assume $a > 0$. What is this limit?

Exercises

Use a computer algebra system, CAS, to help with this set of exercises.

Exercises for Section 4.5, pp 303–305: 5, 11, 17, 25, 29, 32, 41, 47, 49 (l'Hospital's Rule), 51 (CAS), 60 (cable insulation)