

Watch. Practice. Understand. | Lesson 283

The Secret of Calculus Section 4.4 L'Hospital Rule

Watch the matching video: <https://www.youtube.com/watch?v=wLH2aTTdCtQ>

Practice focus: L'Hopital's rule

Original extra practice matched to the listed lesson topic.

Name: _____ Date: _____ Show your reasoning and check units.

01 Evaluate $\lim_{x \rightarrow 0} (e^x - 1)/x$.

02 Evaluate $\lim_{x \rightarrow \infty} \ln x / x$.

03 Evaluate $\lim_{x \rightarrow 0} (1 - \cos x)/x^2$.

04 Why is L'Hopital's rule not applied directly to $\lim_{x \rightarrow 0} (x+1)/(x+2)$?

Worked answers | Lesson 283

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01 Evaluate $\lim_{x \rightarrow 0} (e^x - 1)/x$.

Form $0/0$; differentiating numerator and denominator gives $\lim_{x \rightarrow 0} e^x = 1$.

02 Evaluate $\lim_{x \rightarrow \infty} \ln x / x$.

Form ∞/∞ ; derivative ratio $(1/x)/1$ tends to 0.

03 Evaluate $\lim_{x \rightarrow 0} (1 - \cos x)/x^2$.

Apply the rule twice: $\sin x/(2x) \rightarrow \cos x/2 \rightarrow 1/2$.

04 Why is L'Hopital's rule not applied directly to $\lim_{x \rightarrow 0} (x+1)/(x+2)$?

The form is $1/2$, not $0/0$ or ∞/∞ . Direct substitution gives $1/2$; differentiating would incorrectly give 1.