

Self-Assessment Quiz: Indeterminate Forms and L'Hôpital's Rule

Ungraded Quiz – For Practice and Understanding

Q1. Which of the following represents an **indeterminate form**?

- (a) 0×0
- (b) $\frac{0}{0}$
- (c) $5 \div 0$
- (d) $1 + 1$

Q2. The form $\frac{\infty}{\infty}$ is classified as:

- (a) Determinate
- (b) Indeterminate
- (c) Undefined
- (d) Infinite

Q3. L'Hôpital's Rule can be applied when both the numerator and denominator approach:

- (a) 0 or ∞
- (b) 1 or -1
- (c) Constant values
- (d) Undefined forms

Q4. Evaluate $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ using L'Hôpital's Rule.

- (a) 0
- (b) 1
- (c) ∞
- (d) Does not exist

Q5. For $\lim_{x \rightarrow \infty} \frac{3x^2 + 5x}{4x^2 - 7}$, the result is:

- (a) 0
- (b) $\frac{3}{4}$
- (c) ∞
- (d) $-\infty$

Q6. Which of the following is **not** an indeterminate form?

- (a) $0/0$
- (b) ∞/∞

- (c) $1/\infty$
- (d) $0 \cdot \infty$

Q7. The derivative of $\ln x$ used in L'Hôpital's Rule is:

- (a) x
- (b) $\frac{1}{x}$
- (c) $\ln x$
- (d) x^2

Q8. Which of the following requires logarithmic differentiation before applying L'Hôpital's Rule?

- (a) $\lim_{x \rightarrow 0} (1+x)^{1/x}$
- (b) $\lim_{x \rightarrow 1} \frac{x-1}{x^2-1}$
- (c) $\lim_{x \rightarrow \infty} \frac{x}{x+1}$
- (d) $\lim_{x \rightarrow 0} \frac{1}{x}$

Q9. The form 0^0 is:

- (a) Indeterminate
- (b) Zero
- (c) Undefined
- (d) Infinite

Q10. For $\lim_{x \rightarrow \infty} (1 + \frac{1}{x})^x$, the limit is equal to:

- (a) 0
- (b) 1
- (c) e
- (d) ∞

Q11. To apply L'Hôpital's Rule repeatedly, each resulting limit must remain in the form:

- (a) $\frac{0}{0}$ or $\frac{\infty}{\infty}$
- (b) $\frac{1}{0}$ or $\frac{0}{1}$
- (c) $\infty - \infty$
- (d) 0^0

Q12. The form $\infty - \infty$ can be converted into which L'Hôpital-eligible form?

- (a) $\frac{0}{0}$
- (b) $\frac{\infty}{\infty}$
- (c) Either (a) or (b)
- (d) None of these

Q13. L'Hôpital's Rule **cannot** be applied when:

- (a) The functions are differentiable near the point
- (b) The limit of the derivative ratio does not exist
- (c) Both numerator and denominator approach zero
- (d) The limit of derivatives exists

Q14. The result of $\lim_{x \rightarrow 0} \frac{e^x - 1}{x}$ is:

- (a) 0
- (b) 1
- (c) e
- (d) ∞

Q15. The indeterminate form ∞^0 can often be simplified using:

- (a) Trigonometric identities
- (b) Exponential and logarithmic transformations
- (c) Factoring
- (d) Polynomial expansion

Answers (for self-check):

1(b), 2(b), 3(a), 4(b), 5(b), 6(c), 7(b), 8(a), 9(a), 10(c), 11(a), 12(c), 13(b), 14(b), 15(b)