

4.4 Indeterminate Forms and L'Hospital's Rule

單選題

1. Evaluate the limit of $\lim_{x \rightarrow 0} \left(\frac{1}{\ln(x+1)} - \frac{x+1}{x} \right)^2$.

- (A) 0; (B) $\frac{1}{4}$; (C) 1; (D) nonexistent.

Ans: B [99 學年度]

2. $\lim_{x \rightarrow \infty} \left(\frac{\ln x \cdot x^\pi}{x^e \cdot e^x} \right) =$

- (A) ∞ , (B) π , (C) $\frac{e}{\pi}$, (D) 0.

Ans: D [100 學年度]

3. The limit $\lim_{x \rightarrow 0} \frac{x \sin x}{1 - \cos(2x)} =$

- (A) 2; (B) 1; (C) $\frac{1}{2}$; (D) 0.

Ans: C [104 學年度]

4. Suppose that $f'(a) = 1$ for some constant a . The *possible values* for the limit

$$\lim_{x \rightarrow a} \frac{f(x) - f(a)}{\sqrt[3]{x} - 1} \text{ are}$$

- (A) 0; (B) 1; (C) 2; (D) 3.

Ans: AD [102 學年度]

5. Which of the following statements are **True** ?

(A) $\lim_{x \rightarrow 0} \frac{\tan x - x}{x} = 0$; (B) $\lim_{x \rightarrow 0} x^3 \sin \frac{1}{x} = 0$;

(C) $\lim_{x \rightarrow 0^+} (1+x)^{1/x} = 1$; (D) $\lim_{x \rightarrow 1} \frac{\sin(x-1)}{x^2+x-2} = \frac{1}{3}$.

Ans: ABD [104 學年度]

填充題

1. Evaluate the limit $\lim_{x \rightarrow 0} \left(\frac{2^x + 5^x}{2} \right)^{\frac{1}{x}}$. _____

Ans: $\sqrt{10}$ [99 學年度]

2. $\lim_{x \rightarrow \infty} (e^x + x)^{\frac{e}{x}} =$ _____ .

Ans: e^e [100 學年度]

3. Find the limit $\lim_{x \rightarrow \infty} \frac{x^{2015} (\ln x)^{14}}{e^x} =$ _____.

Ans: 0 [103 學年度]

4. If $\lim_{x \rightarrow \infty} \left(\frac{x+a}{x-a} \right)^x = e$, then $a =$ _____.

Ans: $\frac{1}{2}$ [103 學年度]