
IN-CLASS ACTIVITY : MORE INDETERMINATE FORMS

1. Compute the following limits (not all of them need L'Hopital rule to be solved) :

- | | |
|--|--|
| i) $\lim_{x \rightarrow 0^+} x^2 \ln(x)$ | xii) $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - \sqrt{1-x}}{x}$ |
| ii) $\lim_{x \rightarrow +\infty} x^{\frac{1}{x}}$ | xiii) $\lim_{x \rightarrow 0} \frac{e^x - x - 1}{x^2}$ |
| iii) $\lim_{x \rightarrow 0^+} x^{\frac{2}{x}}$ | xiv) $\lim_{x \rightarrow 0^+} \frac{\tan(x)}{\sqrt{x}}$ |
| iv) $\lim_{x \rightarrow 0^+} \frac{x^2}{\frac{1}{x}}$ | xv) $\lim_{x \rightarrow 1} \frac{x-1}{\ln(x)}$ |
| v) $\lim_{x \rightarrow +\infty} \frac{e^x}{x}$ | xvi) $\lim_{x \rightarrow 0^+} (1+x)^{\frac{1}{x}}$ |
| vi) $\lim_{x \rightarrow 3} \frac{x^2-9}{x-3}$ | xvii) $\lim_{x \rightarrow 0} \frac{\sin(x)-x}{x^2}$ |
| vii) $\lim_{x \rightarrow 3} \frac{x^2-9}{x+3}$ | xviii) $\lim_{x \rightarrow +\infty} (x - e^x)$ |
| viii) $\lim_{x \rightarrow 0^+} \frac{(1+x)^{-2}-1}{x}$ | xix) $\lim_{x \rightarrow 0^+} \frac{3^x-2^x}{x}$ |
| ix) $\lim_{x \rightarrow \pi} \frac{x-\pi}{\sin(x)}$ | xx) $\lim_{x \rightarrow 0^+} \frac{1+1/x}{1-1/x}$ |
| x) $\lim_{x \rightarrow 1} \frac{x-1}{\sin(x)}$ | xxi) $\lim_{x \rightarrow +\infty} \left(1 + \frac{1}{x}\right)^x$ |
| xi) $\lim_{x \rightarrow 0} \frac{\sin(x)-\tan(x)}{x^3}$ | xxii) $\lim_{x \rightarrow 0} \frac{e^x-1}{x}$ |

2. Consider the function $f(x) = x^3 e^{-x}$.

- Find and classify the critical points of $f(x)$.
- Find the inflection points of $f(x)$.
- Compute $\lim_{x \rightarrow \pm\infty} f(x)$.
- Sketch the graph of $f(x)$.