

國立彰化師範大學109學年度碩士班招生考試試題

系所：數學系(選考丙)、
統計資訊研究所(選考丙)

科目：微積分

☆☆請在答案紙上作答☆☆

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1. Show by using the $\delta - \varepsilon$ definition that $\lim_{x \rightarrow 2} x^2 = 4$. (20%)
2. Directly calculate $\lim_{x \rightarrow 0} \frac{(\sin x)^3}{x}$. (20%)
3. Show that there exists $c \in \mathbb{R}$ such that the graph of the function $y = \ln(1 + e^{x^2}) + c$ is tangent to the line $y = x$. (20%)
4. If $\{x_n\}$ is a convergent real sequence, prove that its every subsequence is convergent. (20%)
5. Find the Maclaurin Series for the following functions and determine their intervals of convergence. (10% each)
 - (1) $f(x) = \frac{\sin x}{x}$.
 - (2) $g(x) = \int_0^x e^{-t^2} dt$.