

招生學年度	104	招生類別	碩士班
系所班別	應用數學系碩士班		
科目名稱	微積分		
注意事項	本考科禁止使用掌上型計算機		

- (2%) Find out $\frac{d \sin(x^2)}{dx}$.
- (5%) Find out $\frac{dx^{x^x}}{dx}$.
- (3%) Find out $\int \frac{1+e^x}{e^x} dx$
- (30%) Let $a_1, a_2, \dots, a_n, \dots$ be a strictly decreasing (real) sequence and $\lim_{n \rightarrow \infty} a_n = 0$. Show that $\sum_{n=1}^{\infty} 1 - \frac{a_{n+1}}{a_n}$ diverge.
- (30%) Fix an $N > 2$ and given $x_1, x_2, \dots, x_N, y_1, y_2, \dots, y_N, m_1, m_2, \dots, m_N \in \mathbb{R}$. Construct a differentiable $f : \mathbb{R} \rightarrow \mathbb{R}$, such that $f(x_i) = y_i$ and $f'(x_i) = m_i$ for every $1 \leq i \leq N$.
- (30%) Find the 100th derivative of $\frac{x^2+1}{x^3-x}$.