

淡江大學九十學年度進修學士班轉學生招生考試試題

系別：電機、資訊系二年級

准帶項目請打「○」否則打「×」	
計算機	字典
○	×

科目：微 積 分

本試題共 / 頁

務必書寫演算過程，否則不予計分

1. Find the following: (每一小題佔 7%)

(a) $\lim_{x \rightarrow 1^-} \frac{x^2 - 1}{|x - 1|}$

(b) $\lim_{x \rightarrow 0} (1 - 2x)^{\frac{1}{x}}$

(c) $f_z(3, 2, 1)$ where $f(x, y, z) = \frac{x}{y+z}$.

(d) $(f^{-1})'(2)$, where $f(x) = 1 + 3x + e^x$.

2. Find the following: (每一小題佔 8%)

(a) $\int_e^{e^4} \frac{dx}{x\sqrt{\ln x}}$

(b) $\iint_R \sin x \cos y \, dA$, where $R = \{(x, y) : 0 \leq x \leq \frac{\pi}{2}, 0 \leq y \leq \frac{\pi}{4}\}$.

(c) The absolute minimum value of $f(x) = x^2 + \frac{2}{x}$ on $[\frac{1}{2}, 2]$.

(d) An equation of the tangent line to the curve $x^y = y^x$ at the point $(1, 1)$.

3. Show that the equation $x^5 + 10x + 3 = 0$ has exactly one real root. (12%)

4. (a) Find the power series representation for $\tan^{-1} x$.

(b) Express $\int_0^1 \frac{\tan^{-1} x}{x} dx$ as the sum of an infinite series. (14%)

5. Find the local maximum and minimum values and saddle point(s) of the function

$$f(x, y) = 3x^2y + y^3 - 3x^2 - 3y^2 + 2.$$

(14%)