

149-1

淡江大學 96 學年度碩士班招生考試試題

系別：管理科學研究所

科目：微 積 分

准帶項目請打「V」	
X	簡單型計算機

本試題共 1 頁

一. Solve the following problems:

(20%)

(i) $\lim_{x \rightarrow 1^-} \left(\frac{1}{1-x} + \frac{1}{\ln x} \right) = ?$, (ii) $\lim_{x \rightarrow \infty} (1+x)^x = ?$ (iii) $\int \frac{1}{4-x^2} dx = ?$, (iv) $\int \frac{dx}{\sqrt{4-x^2}} = ?$

二. Prove: $\frac{d}{dx}(x^n) = nx^{n-1}$ where n is a real number

(15%)

三. Use integration to find the volume under surface $f(x,y) = 12xy$ above the region $R = \{(x,y) \mid y = \sqrt{x} \text{ and } y = x^2\}$

(15%)

四. Find the Taylor series at $x=0$ for function $f(x) = e^x$ (10%) and estimate $e^{\frac{1}{2}}$ by using the first four terms of the Taylor series (5%).

(15%)

五. Find the critical points, extreme values, points of inflection, and then sketch the graph of function $f(x) = \frac{x}{1+x^2}$.

(20%)

六. A company's output is given by the Cobb-Douglas production function $P = 600 L^{\frac{2}{3}} K^{\frac{1}{3}}$ where L and K are the numbers of units of labor and capital. Each unit of labor costs the company \$40, and each unit of capital costs the company \$100. If the company has a total of \$3000 for labor and capital, how much of each should it use to maximize production?

(15%)