

# 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：統計學系二年級

准帶項目請打「○」否則打「×」	
計算機	字典
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科目：微 積 分

本試題共 / 頁

## 一. 填充題 (每格 6 分, 共 60 分)

請按題號依序作答, 並註明題號. 不必寫出演算過程.

1. Consider  $f(x) = \begin{cases} \sqrt{x}-1 & x < 1 \\ \frac{\sqrt{x}-1}{x-1} & x > 1 \end{cases}$  then  $\lim_{x \rightarrow 1^+} f(x) = \underline{\hspace{2cm}} (a)$ .

2.  $\frac{d}{dx}(x^2 + 1)^x = \underline{\hspace{2cm}} (b)$ .

3.  $\int x^2 e^{-2x} dx = \underline{\hspace{2cm}} (c)$ .

4.  $\int \frac{\sin(\ln 5x)}{x} dx = \underline{\hspace{2cm}} (d)$ .

5. Consider  $f(x, y) = e^{x^5 + 2x^2y - 3y^4}$ , then  $f_{xy} = \underline{\hspace{2cm}} (e)$ .

6. The equation of the tangent line to the graph of the  $(2x - y - 3)^4 = 8x$  at the point (2, 3) is  $\underline{\hspace{2cm}} (f)$ .

7. Suppose that the quantity demanded weekly of the Super Titan radial tires is related to its unit price by the equation  $p + x^2 = 144$ , where  $p$  is measured in dollars and  $x$  is measured in units of a thousand. How fast is the quantity demanded changing when the unit price is \$63 and the price per tire is increasing at the rate of \$2 per week. Answer:  $\underline{\hspace{2cm}} (g)$ .

8. Find the volume of the solid of resolution obtained by revolving the region bounded by the curves  $y = x^2$  and  $y = x^3$  about the  $x$ -axis. Answer:  $\underline{\hspace{2cm}} (h)$ .

9. If  $f(x, y) = x^4 - 4xy + y^4$ . Then  $f(x, y)$  has relative minima at points  $\underline{\hspace{2cm}} (i)$  and saddle point(s)  $\underline{\hspace{2cm}} (j)$ .

## 二. 計算題 (每題 10 分, 共 40 分)

1. Find the improper integral  $\int_{-\infty}^{\infty} \frac{e^x}{(e^x + 1)^2} dx$ .

2. John Mill a manufacturer of model airplane engines, finds that it takes  $x$  units of labor and  $y$  units of capital to produce  $f(x, y) = 100x^{\frac{1}{2}}y^{\frac{1}{4}}$  units of the product. If a unit of labor costs \$100, a unit of capital costs \$200, and \$200,000 is budgeted for production. Use the Lagrange multiplier method to determine how many units should be expended on labor and how many units should be expended on capital in order to maximize production.

3. Find the double integral  $\int \int_R e^{-x^2} dA$ , where  $R$  is the region bounded by curves  $y = x$ ,  $y = 0$  and  $x = 1$ .

4. Find the Taylor series of the function  $f(x) = \frac{1}{x-1}$  at  $x = 2$ .