

# 淡江大學100學年度轉學生招生考試試題

系別：理工組二年級

科目：微積分

8-1

考試日期：7月18日(星期一) 第3節

本試題共 14 大題，第 1 頁

第一部份 簡答題 (60%)，(不需寫出演算過程，答案依照題號寫在答案卷第一頁題號要清楚標明，共十題，每小題六分)：

1. 求極限  $\lim_{h \rightarrow 0} \frac{\frac{x+h}{(x+h)^2+1} - \frac{x}{x^2+1}}{h}$ .
2. Find the minimum of the curve  $f(x) = x^m - mx$ ,  $x > 0$ , where  $m$  is an integer  $\geq 2$ .
3. The region  $R$  between the curves  $y = 2 - x^2$  and  $y = x^2$  is rotated about the  $x$ -axis generating a solid  $S$ . Find the volume of  $S$ .
4. Find the first three nonzero terms of MacLaurin's series of the function,  $f(x) = \ln(1 + \sin x)$ .
5. 求極限  $\lim_{x \rightarrow 3} (x + \frac{1}{x-3})(\sqrt{x+1} - 2)$ .
6. Evaluate the indefinite integral  $\int \frac{\sqrt{x}}{2 + \sqrt{x}} dx$ .
7. Find the equation of the tangent line to the curve  $y^3 - xy^2 + \cos xy = 2$  at the point  $(0,1)$ .
8. Find the equation of the tangent plane to the given surface,  $z = 1 + \sin(2x + 3y)$ , at the point  $(0,0)$ .
9. Find the interval of convergence of the series  $\sum_{n=0}^{\infty} \frac{(n!)^2}{(2n)!} (x+5)^n$ .
10. A linear change of variables has  $x = au$ ,  $y = bv$ , and  $z = cw$ . Find the Jacobian of this transformation.

背面尚有試題

# 淡江大學100學年度轉學生招生考試試題

系別：理工組二年級

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8-2

考試日期：7月18日(星期一) 第3節

本試題共 14 大題，第 2 頁

第二部份 計算證明題 ( 40 % )，( 演算過程必須寫清楚，直接寫答案不計分 )，  
共四題，每小題十分)：

1. (a) State the Mean Value Theorem.

(b) Suppose  $f$  is differentiable and  $f'(x) > 1$  for all  $x$ . If  $f(0) = 0$ , show that  $f(x) > x$  for all positive  $x$ .

2. Find  $\int_0^2 \frac{2}{\sqrt{x}} + \frac{1}{\sqrt{2-x}} dx$ .

3. Find the maximum and minimum of the function  $f(x, y) = 4 + xy - x^2 - y^2$  over to the set  $S = \{(x, y) : x^2 + y^2 \leq 1\}$ .

4. Find the volume of the solid bounded by the four planes,  $x = 0$ ,  $y = 0$ ,  $z = x + y$ , and  $z = 1 - x - y$ .