

# 淡江大學 109 學年度日間部寒假轉學生招生考試試題

系別：理、工組二年級

科目：微積分

23

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考試日期：1月18日(星期一) 第2節

本試題共 9

大題，1

頁

#注意：務必要有計算過程，否則不予計分

1. Evaluate the following limits(求極限). (10 points)

(1)  $\lim_{x \rightarrow -\infty} \frac{2x}{3\sqrt{x^2+1}}$       (2)  $\lim_{x \rightarrow 1} \left( \frac{\ln x}{x-1} \right)$ .

2. Find  $f'(4)$  (10 points) if

(1)  $f(x) = \int_2^{1/x} \sin^4(\pi y) dy$ .      (2)  $f(x) = (x^{3/2} \sqrt{x^2+9}) / (3x-11)^2$ .

3. Find  $\frac{dy}{dx}$ . (10 points) if (1)  $y = \cos(x^3 + 1)$       (2)  $y = x^x$ .

4. Find the absolute maximum and absolute minimum values of  $f(x) = x^3 - 6x^2$  on  $[-1, 7]$ .  
(求絕對極大與絕對極小) (10 points)

5. Find the following integrals (20 points)

(1)  $\int x \sin x dx$       (2)  $\int_{-1}^8 |\sqrt[3]{x} - 1| dx$ .      (3)  $\int_1^{\infty} \frac{1}{\sqrt[3]{x^4}} dx$       (4)  $\int x e^{x^2} dx$

6. Find the local (relative) maximum and minimum values and saddle points of the function(求相對極大與相對極小，鞍點)

$f(x, y) = x^3 - 12xy + 8y^3$ . (10 points)

7. Evaluate  $\iint_R x \cos(xy) dA$ , where  $R$  is the rectangular  $0 \leq x \leq \pi$  and  $0 \leq y \leq 1$ . (10 points)

8. Find an equation of the tangent plane to the surface  $z = y^2 + x^2$  at the point  $(1, 2, 5)$ (求切平面方程式). (10 points)

9. Find  $\frac{\partial z}{\partial x}$  if  $z$  is defined implicitly as a function of  $x$  and  $y$  by the equation

$x^3 + y^3 + z^3 + 6xyz = 1$ . (10 points)