

# 淡江大學 98 學年度進修學士班轉學生招生考試試題

系別：理工組二年級

科目：微 積 分

准帶項目請打「V」	
	計算機

本試題共 9 大題， / 頁

需有計算過程，直接寫答案不計分。

1. Find the following limits: (14%)

(a)  $\lim_{x \rightarrow 2^+} \frac{x^2 + 3x - 10}{x^2 - 4x + 4}$ . (b)  $\lim_{x \rightarrow \infty} \frac{\ln x}{x^a}$ ,  $a$  is a positive number.

2. Evaluate the following derivatives: (14%)

(a)  $\frac{d}{dx} \left( \frac{1 + \sin x}{\cos x} \right)$ . (b)  $\frac{d}{dx} (x^x)$ ,  $x > 0$ .

3. Evaluate the following integrals: (14%)

(a)  $\int_1^2 \ln x \, dx$ . (b)  $\int \frac{dx}{\sqrt{16 + 6x - x^2}}$ .

4. Show that  $\sum_{k=1}^{\infty} \frac{1}{(k+2)(k+3)}$  converges and find its sum. (8%)

5. Show that  $f(x) = |x|$  is continuous at 0 and  $f'(x)$  does not exist at  $x = 0$ . (10%)

6. Find the equation of the tangent line to the curve  $y^3 - xy^2 + \cos xy = 2$  at the point  $(0, 1)$ . (10%)

7. Find the volume of the solid of revolution obtained by revolving the plane region  $R$  bounded by  $y = \sqrt{x}$ , the  $x$ -axis, and the line  $x = 4$  about the  $x$ -axis. (10%)

8. Find the Taylor polynomial of order 2 based at  $a = 0$  for  $f(x) = \sqrt{1+x}$  and use it to approximate  $\sqrt{1.12}$ . (10%)

9. In the Polar coordinates system, analyze the equation  $r = 2 + 4 \cos \theta$  for symmetry and sketch its graph. (10%)