

## 淡江大學八十七學年度進修教育學士班轉學生入學考試試題

系別：理工組二年級

科目：微積分

本試題共 2 頁

務必將每一題之演算過程寫在答案紙上，否則一律不予計分!!!

答案一律寫在答案紙每一頁的左邊，否則不予計分。例如：

(1) If  $F(x) = 2x + 1$ , then  $F(1) = ?$

答案寫成：(1) Ans.  $F(1) = 3$ .

(5%) 1. Let

$$f(x) = \begin{cases} x^2, & \text{if } x \leq 1; \\ \sqrt{x}, & \text{otherwise.} \end{cases}$$

Determine whether the function  $f(x)$  is differentiable at  $x = 1$ . (Give the explanation or prove your answer.)

(65%) 2. Solve the following problems.

(a)

$$\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2 + 2}}{3x - 6} = ?$$

(b)

$$\lim_{x \rightarrow -1} \frac{x^2 - 3x - 4}{x^2 - 1} = ?$$

(c)

$$\lim_{x \rightarrow 0^-} \frac{x}{|x|} = ?$$

(d)

$$\lim_{y \rightarrow 4} \frac{4 - y}{2 - \sqrt{y}} = ?$$

(e)

$$\lim_{t \rightarrow 0} \frac{te^t}{1 - e^t} = ?$$

(f) If  $f(x) = (\sin x)(2 + \cos x)$ , then  $f'(x) = ?$

(g) If  $f(x) = \frac{x-1}{2+\sec x}$ , then  $f'(x) = ?$

(h) If  $\frac{1}{y} + \frac{1}{x} = 1$ , then  $\frac{dy}{dx} = ?$

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(i)

$$\int_1^2 xe^{3x} dx = ?$$

(j)

$$\int \frac{x+1}{x-1} dx = ?$$

(k)

$$\int x \ln(4x) dx = ?$$

(l)

$$\int_1^{\infty} \frac{dx}{x^2} = ?$$

(m)

$$\int_2^4 \int_{x/2}^{\sqrt{x}} xy dy dx = ?$$

(5%) 3. If  $g(x, y) = \sin(xy) + xe^y$ . Then  $g_{xy}(0, 3) = ?$

(5%) 4. Find the volume of the solid produced by revolving about the  $x$ -axis the region bounded by  $y = \sqrt{x}$ , the  $x$ -axis,  $x = 1$ , and  $x = 3$ .

(10%) 5. Determine the area enclosed by  $y = |x|$  and  $y = -x^2 + 2$ .

(10%) 6. Find the power series for  $\frac{\ln(1+x)}{x}$ .