

# 淡江大學 107 學年度進修學士班轉學生招生考試試題

系別：工組二年級

科目：微 積 分

4-1

考試日期：7 月 25 日(星期三) 第 2 節

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請詳列計算過程，否則不予計分。

1. Find the limits. (15%)

(a)  $\lim_{x \rightarrow 1} \frac{x^2 - 3x + 1}{2x^2 + 3}$

(b)  $\lim_{x \rightarrow 0} \frac{\sqrt{9+x} - 3}{x}$

(c)  $\lim_{x \rightarrow 0} \frac{\sin(2x)}{5x}$

2. Find  $\frac{dy}{dx}$ . (20%)

(a)  $y = x^2 \sqrt{2x^2 + x}$

(b)  $y = x^x$

(c)  $\cos(x^3 y^2) = x^2$

(d)  $y = \int_2^{x^2} \frac{dt}{1+\sqrt{t}}$

3. Evaluate the integral. (20%)

(a)  $\int_1^5 (2x^{-\frac{3}{2}} + 2\sqrt{x} + x^3) dx$

(b)  $\int 4x \tan(x^2) dx$

(c)  $\int \frac{1}{1+e^x} dx$

(d)  $\int_0^4 \sqrt{x(4-x)} dx$

4. Test the series for convergence or divergence and state which test applies. (10%)

(a)  $\sum_{n=1}^{\infty} \frac{n+1}{3n+1}$

(b)  $\sum_{n=0}^{\infty} \frac{(-1)^{n+1}}{(n+1)2^n}$

5. Find any intercepts, relative extrema, points of inflection, and asymptotes and sketch a graph of the

function  $f(x) = \frac{x^3}{x^2 - 4}$ . (25%)

6. Evaluate the integral  $\iint_R (x^2 + y^2) dA$  over the region  $R$ : bounded by  $y = \sqrt{4 - x^2}$ ,  $y = 0$  (10%)