

淡江大學 108 學年度進修學士班寒假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：109 年 1 月 13 日(星期一) 第 2 節

本試題共 8 題， 1 頁

請詳列計算過程，否則不予計分。

1. Find the limits. (15%)

(a) $\lim_{x \rightarrow 9} \frac{\sqrt{x}-3}{x-9}$

(b) $\lim_{x \rightarrow 0} \frac{\tan(3x)}{\sin(8x)}$

(c) $\lim_{x \rightarrow \infty} (x - \sqrt{x^2 + x})$

2. Find $\frac{dy}{dx}$. (15%)

(a) $y = x^{1.5} + \cos(x^2) + \ln x^3 + e^{x^4}$

(b) $y = \int_{\tan(x)}^0 \frac{dt}{1+t^2}$

(c) $x^3 + 4xy - 3y^{\frac{4}{3}} - 2x = 0$

3. Evaluate the integral. (15%)

(a) $\int_0^1 (1 + \frac{1}{2}x^4 + \sin(2x))dx$

(b) $\int (5^x + \frac{1}{x \log_{10} x})dx$

(c) $\int \sqrt{1-9x^2} dx$

4. Let $f(x) = \frac{x^3}{3x^2+1}$. Find all possible relative extreme points, and inflection points, and sketch the curve. (15%)

5. Solve the initial value problem, $\frac{dy}{dx} + xy = x, y(0) = -6$. (10%)

6. Find the series' radius and interval of convergence of $\sum_{n=1}^{\infty} \frac{(3x+1)^n}{2n+2}$. (10%)

7. Use Lagrange multiplier to find the extreme values of $f(x, y) = x^2y$ on $x + y = 3$. (10%)

8. Calculate the double integral $\int_0^1 \int_0^{\sqrt{1-y^2}} (x^2 + y^2) dx dy$ (10%)