

## 淡江大學九十一學年度進修學士班轉學生招生考試試題

系別：統計學系二年級

科目：微 積 分

准帶項目請打「○」否則打「×」
計 算 機
○

本試題共 1 頁

## 一、填充題(共 10 題, 每小題 6 分)

請按題號依序作答, 並註明小題號。不必寫出演算過程。

1.  $\lim_{x \rightarrow 0} \frac{x-1+\cos x}{2x} = \underline{\hspace{2cm}}^\circ$

2.  $\lim_{x \rightarrow 2} \frac{x^2-4}{\ln(x^2-3)} = \underline{\hspace{2cm}}^\circ$

3.  $\int \sqrt{1+\sin x} \cos x dx = \underline{\hspace{2cm}}^\circ$

4.  $\frac{d}{dx} \left( \frac{\log_2 x}{x+1} \right) = \underline{\hspace{2cm}}^\circ$

5.  $\frac{d}{dx} \left( \frac{1}{(2x+e^x)^2} \right) = \underline{\hspace{2cm}}^\circ$

6.  $\frac{d}{dx} (x^2 (\ln x)^2) = \underline{\hspace{2cm}}^\circ$

7.  $\int \frac{dx}{9x^2-64} = \underline{\hspace{2cm}}^\circ$

8.  $\int_e^\infty \frac{dx}{x \ln x} = \underline{\hspace{2cm}}^\circ$

9.  $\int \frac{e^{2x}+1}{e^x} dx = \underline{\hspace{2cm}}^\circ$

10.  $\int_0^1 \int_{\sqrt{y}}^y 2x dx dy = \underline{\hspace{2cm}}^\circ$

## 二、計算題(共 40 分) 必須寫出計算過程, 否則不予計分。

- (10%) Assume that a spider is spinning a circular web, and suppose that the radius of the web is changing at the rate of 8 millimeters per hour.
  - Find the rate at which the area of the web is increasing when the radius is 50 millimeters.
  - Find the rate at which the circumference (圓周) is increasing when the radius is 50 millimeters.
- (10%) Given that  $e^x = 1 + x + \frac{1}{2!}x^2 + \frac{1}{3!}x^3 + \dots + \frac{1}{n!}x^n + \dots$  for  $-\infty < x < \infty$ . Find the first four nonzero terms of the Taylor series about zero for the hyperbolic sine function which is defined as  $\sinh x = \frac{1}{2}(e^x - e^{-x})$ .
- (10%) Determine the area of the region enclosed by  $y = x^3$  and  $y = x$ .
- (10%) Find the relative extrema of  $f(x, y) = x^3 + y^3 - 3x^2 - 3y^2 - 9x + 4$ .