

淡江大學102學年度日間部轉學生招生考試試題

系別: 商管組二年級

科目: 微積分

考試日期: 7月23日 (星期二) 第4節

本試題共 8 大題, 1 頁

注意事項: (1) 請按題號順序作答。(2) 可用鉛筆。(3) 不可使用計算機。(4) 需要計算過程。

1. (10%) (a) Find $\lim_{x \rightarrow \infty} \frac{\ln x}{\ln \sqrt{x} + 10}$. (b) Find $\lim_{x \rightarrow 2} [x^3 + 1]$, where $[\cdot]$ is Gauss' symbol.

2. (10%) Find the constants a and b such that the function

$$f(x) = \begin{cases} x^2 - 2x, & x \leq 1 \\ ax + b, & x > 1 \end{cases} \text{ is differentiable at } x = 1.$$

3. (10%) If $y = (x^2 + 1)^{\sin^3 x}$, find dy/dx .

4. (20%) Find the integrations.

(a) $\int_0^3 \frac{1}{(x-1)^{2/3}} dx$. (b) $\int \sec x dx$. (c) $\int e^x \cos x dx$.

5. (10%) What is The Fundamental Theorem of Calculus?

6. (10%) Investigate the convergence of the series.

(a) $\sum_{n=1}^{\infty} \frac{4^n n! n!}{(2n)!}$ (b) $\sum_{n=0}^{\infty} ar^n$, where a is a nonzero real number.

7. (15%) Use a double integral to find the area of the region bounded by $0 \leq x \leq 8$, $y = 0$, $y = 2x$ and $xy = 8$.

8. (15%) A business sells 2000 units of a product per month at a price of \$10 each. It can sell 250 more items per month for each \$0.25 reduction in price. What price per unit will maximize the monthly revenue?