淡江大學九十一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

准帶項目請打「○」否則打「×」
計　算　機　×

一. 填充題 (每小格 7 分, 共 70 分)

請依順序寫上小題號. 只須寫答案, 不必寫出計算過程.

1. $\lim_{x\to 1} \dfrac{x-1}{\sqrt{x-1}} =$ _____.

2. $\lim_{h\to 0} \dfrac{3^h-1}{h} =$ _____.

3. $\dfrac{d}{dx}\left[e^{x^2+3x}\cdot \ln(2x^4+x^2)\right] =$ _____.

4. $\dfrac{d}{dx}\dfrac{\cos 2x}{x^3} =$ _____.

5. $\dfrac{d}{dx}\int_{-x^2}^{x^3}\sqrt{t^2+t}\,dt =$ _____.

6. $\int_1^2 \dfrac{x-1}{e^x}\,dx =$ _____.

7. $\int_0^{\frac{\pi}{3}} \cos^2 x\,\sin x\,dx =$ _____.

8. For $x^3 - xy^4 + 2y^{\frac{3}{2}} - y = 7$, the slope of the tangent line at the point $(2,1)$ is $=$ _____.

9. For the function $f(x) = 2x^3 - 3x^2 - 36x + 4$ on the interval $[-5, 10]$, the absolute (global) minimum value is $=$ _____.

10. The volume under the surface $f(x,y) = 1$ over the region $0 \le y \le 2$ and $y \le x \le e^y$ is $=$ _____.

二. 計算題 (每小題 10 分, 共 30 分)　　必須寫出計算過程, 否則不予計分.

1. The production function for a company is defined by $f(x,y) = 16x^{\frac{1}{4}}y^{\frac{3}{4}}$, where x is the number of units of labor and y is the number of units of capital. Each unit of labor costs \$5, and each unit of capital costs \$10. If the company has \$5000 budgeted for costs, find the number of units of labor and capital that maximize production.

2. Determine the improper integral $\int_0^1 \dfrac{1}{\sqrt[3]{x^5}}\,dx$ is convergent or divergent.

3. Find the Taylor series for $f(x) = xe^{x^2}$ at $x = 0$.