淡江大學99學年度轉學生招生考試試題

系別：理工組二年級　　科目：微　積　分

本試題共　　大題，2 頁

第一部份 簡答題（60 %），（不需寫出演算過程，答案依照題號寫在答案卷第一頁，題號要清楚標明，共十題，每小題六分）：

1. Find $\lim_{x\to\infty}(\sqrt{x^2+x}-\sqrt{x^2-x})$.
2. Find an equation for the tangent to the curve $y=x^3-4x+1$ at the point $(2,1)$.
3. Find $\lim_{x\to 0}\frac{1}{x^3}\int_0^x \frac{t^2}{t^4+1}dt$.
4. Evaluate the improper integral $\int_{-1}^{\infty}\frac{dx}{x^2+5x+6}$.
5. The region bounded by the curve $y=\sqrt{x}$, the x-axis, and the line $x=4$ is revolved(迴轉) about the x-axis to generate a solid. Find the volume(體積) of the solid.
6. Find the length of the curve $r=\sqrt{1+\cos 2\theta}$, $0\le\theta\le\pi\sqrt{2}$.
7. Find the interval of convergence of the series $\sum_{n=0}^{\infty}\frac{x^n}{\sqrt{n^2+3}}$.
8. Find the derivative of $f(x,y)=xe^y+\cos xy$ at the point $(2,0)$ in the direction $\mathbf{v}=3\mathbf{i}-4\mathbf{j}$.
9. Calculus the iterative integral $\int_0^1\int_y^1\frac{\sin x}{x}\,dx\,dy$.
10. Calculus the iterative integral $\int_0^{\ln 2}\int_0^{\sqrt{(\ln 2)^2-y^2}} e^{\sqrt{x^2+y^2}}\,dxdy$.

背面尚有試題

第二部份 計算證明題（40 % ），（演算過程必須寫清楚，直接寫答案不計分，共四題，每小題十分）：

1. Show that for any real number a and b, the inequality $|\sin b - \sin a| \leq |b - a|$ is true.

2. Sketch the curve(畫詳圖) $y = \dfrac{x}{x^2 + 1}$.

3. Find the maximum and minimum values of the function $f(x, y) = x + 2y$ subject to the constraints $x + y + z = 1$ and $y^2 + z^2 = 4$.

4. Find the volume(體積) of the region D enclosed by the surfaces $z = x^2 + 3y^2$ and $z = 8 - x^2 - y^2$.