03

國立臺北科技大學

九十六學年度四年制二、三年級轉學生招生考試

系所組別：四技二年級專業科目（一）

第二節　微積分 試題

注意事項：

1. 本試題共 8 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Evaluate $\lim_{n\to\infty}\frac{n}{(n!)^{1/n}}=?$ (10%)

2. Find the equation of the tangent line of the curve $(x+y)\ln\sqrt{x+y^2}+\tan^{-1}\frac{y}{x}+\frac{\pi}{4}=0$ at the point $(1,-1)$. (15%)

3. Set $\Omega=\{(x,y)|\,0\le y\le x^{\alpha},0\le x\le 1\}$, $\alpha\ge 0$ and let $y=x^{\beta}$ bisect the area of Ω. Express β in terms of α. (10%)

4. Evaluate $\int\frac{x}{x^3+1}dx=?$ (15%)

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

6. Find the area between the large loop and the small loop of the polar curve $r=1-2\sin\theta$. (15%)

7. Evaluate $\iiint_E\sqrt{x^2+y^2}\,dV$, where E is the region that lies inside the cylinder $x^2+y^2=4$ and between two planes $z=0$ and $z=2$. (10%)

8. Evaluate $\iint_R(x-y)^2e^{x+y}\,dA$, where R is the square region with vertices (0, 0), (1, 1), (2, 0), (1, −1). (15%)