臺灣綜合大學系統112學年度學士班轉學生聯合招生考試試題

科目名稱	微積分A	類組代碼	共同考科
		科目碼	E0011

※本項考試依簡章規定所有考科均「不可」使用計算機。　　本科試題共計 1 頁

1. (10%) Evaluate the limit.
$$\lim_{x\to 4}\frac{4-x}{2-\sqrt{x}}.$$

2. (10%) Find the point on the curve $y=\sqrt{x}$ that is closest to the point $(1,0)$.

3. (10%) If $f(x)=\int_2^{e^x}\sqrt{1+t^2}dt$, find $(f^{-1})'(0)$.

4. (10%) Find the length of the polar curve $r=\sin^3(\theta/3),\ 0\le\theta\le\pi$.

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

6. (10%) Find the unit tangent vector and the unit normal vector for the curve $\mathbf{r}(t)=\cos 3t\mathbf{i}+\sin 3t\mathbf{j}+4t\mathbf{k}$.

7. (10%) Find equations of the tangent plane and the normal line to the surface $x+2y+3z=\sin(xyz)$ at the point $(2,-1,0)$.

8. (10%) Evaluate the integral $\int_0^{1/2}\int_{\sqrt{3}y}^{\sqrt{1-y^2}}x^2y\,dx\,dy$.

9. (10%) Evaluate $\int_C\mathbf{F}\cdot d\mathbf{r}$, where $\mathbf{F}=\langle ye^{xy},xe^{xy}\rangle$ and C is the unit circle $x^2+y^2=1$.

10. (10%) Evaluate $\iint_S\mathbf{F}\cdot d\mathbf{S}$, where $\mathbf{F}(x,y,z)=(z^2x+e^y)\mathbf{i}+(x^2y+\cosh z)\mathbf{j}+(y^2z+x)\mathbf{k}$ and S is the top half of sphere $x^2+y^2+z^2=1$.