

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.

$$\lim_{x \rightarrow 4} \frac{4-x}{2-\sqrt{x}}.$$

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  $r = \sin^3(\theta/3)$ ,  $0 \leq \theta \leq \pi$ .

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  $\int_0^{1/2} \int_{\sqrt{3}y}^{\sqrt{1-y^2}} x^2 y dx dy$ .

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  $x^2 + y^2 + z^2 = 1$ .