

# 國立屏東教育大學 100 學年度學士班轉學招生考試

## 微積分 試題

(應用數學系 / 資訊科學系 / 應用物理系 / 電腦與智慧型機器人學士學位學程)

\*注意事項：(1) 本試題共 1 頁，答案請「橫式」書寫，並依規定上下翻頁，否則不予計分。  
(2) 不必抄題，但請依序將題號標出，並寫在答案紙上。

1. Find the vertical asymptotes of  $f(x) = \frac{x^2 + 2x - 8}{x^2 - 4}$ . (10%)

2. Find the equation of tangent line of  $f(x) = x^2$  at  $x = -2$ . (10%)

3. Find the derivative of  $f(x) = 3x^2 \sin^2 x$ . (10%)

4. Find the derivative of  $f(x) = x^2 \sqrt{1 - x^2}$ . (10%)

5. Prove  $\lim_{x \rightarrow \infty} \frac{\sin x}{x} = 0$  (10%)

6. Find the limit: (16%)

(a)  $\lim_{x \rightarrow 0} \frac{x^2 \cos \frac{1}{x}}{\sin x}$ ; (b)  $\lim_{x \rightarrow 0^+} \sqrt{x}^{\sqrt{x}}$ .

7. Find the interval of convergence of  $\sum_{i=1}^{\infty} \frac{(x-2)^i}{3^i i^2}$ . (10%)

8. Find the tangent line to the folium of Descartes given by  $x^3 + y^3 = 3xy$  at the point  $(3/2, 3/2)$ . (12%)

9. Find the area of the region  $R$  bounded by the line  $y = \frac{1}{2}x$  and the parabola  $y^2 = 8 - x$ . (12%)