

國立嘉義大學九十四學年度  
數學教育研究所碩士班招生考試試題

科目：微積分

1. Find the area between the curves  $y = \frac{1}{x^2+1}$  and  $y = \frac{x^2}{2}$ . (20%)
2. Find the local extrema of the function  $f(x, y) = 2xy(3-x-y)$ . (20%)
3. Evaluate  $\lim_{x \rightarrow 1} \frac{1-x}{2} \cdot \tan \frac{\pi x}{2}$ . (10%)
4. Prove that if  $\lim_{n \rightarrow \infty} na_n = 1$ , then the series  $\sum_{n=1}^{\infty} a_n$  diverges. (20%)
5. Let  $f(x) = |x|\sin x$ . Is  $f$  differentiable at 0? Justify your answer. (20%)
6. Evaluate  $\int_0^1 \ln x \, dx$ . (10%)