

國立彰化師範大學113學年度碩士班招生考試試題

系所：數學系(選考丙)、

科目：微積分

統計資訊研究所(選考丙)

☆☆請在答案紙上作答☆☆

共1頁，第1頁

1. (20%) Let $b \in [0,1]$. The function $y = 1 - x^2$ on the interval $[0,1]$ is revolved about the line $y = b$. Find the value b that minimizes the volume the solid.

2. (16%) Use the $\varepsilon - \delta$ definition to show that

$$\lim_{x \rightarrow 1^+} \frac{1}{x-1} = \infty.$$

3. (20%) Find the absolute extreme values for the function

$$f(x, y) = 2x^2 + y^2 - 4x - 2y + 2$$

on the set $D = \{(x, y) : 0 \leq x \leq 2, 0 \leq y \leq 2x\}$.

4. (20%) Calculate the integral

$$\int \frac{1}{x^3 + 1} dx.$$

5. (12%) Let $F(x) = \int_0^x sf(s) \int_0^s f(t) dt ds$,

where f is a differentiable function on $[-1, 1]$. Find $F''(0)$.

6. (12%) Find the interval of convergence for the power series

$$\sum_{k=1}^{\infty} \frac{2^k}{(3k)!} (x-1)^{2k}.$$