

臺灣大學數學系

八十四學年度碩士班甄試入學考試試題

高等微積分

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1. Find the values of a and b for the ellipse $x^2/a^2 + y^2/b^2 = 1$ of least area containing the circle $(x - 1)^2 + y^2 = 1$ in its interior.

2. Find the volume of the n -dimensional ball with radius $r : \{x \mid \sum_{i=1}^n x_i^2 \leq r^2\}$.

3. Suppose that $f : \rightarrow$ is twice continuously differentiable and $f''(x) > 0$. Show that

(a) for any $a < b$,

$$f'(a) < \frac{f(b) - f(a)}{b - a} < f'(b).$$

(b) for any $a < x < b$,

$$f(x) < f(a) + \frac{f(b) - f(a)}{b - a}(x - a).$$

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