

系所組別：環境醫學研究所甲組

考試科目：微積分

考試日期：0220 · 節次：2

※ 考生請注意：本試題 可 不可 使用計算機

1. Describe Mean Value Theorem (10%)

2. Find the following limits (10% each)

A. $\lim_{x \rightarrow 0} \frac{3x^4 - 4x^3 - 4x^2 + 4x + 1}{x - 1}$

B. $\lim_{x \rightarrow \infty} [\sqrt{x(x+4)} - x]$

3. Find vertical asymptotes of the rational function $f(x) = \frac{x^2 - x}{x^2 + 4x - 21}$ (10%)4. Let $f(x) = \frac{x \log_2(8)}{e^{x^2}}$, find $f'(0)$ (10%)5. Let $y = (x^2 + 9)^{(x+9)}$, find $\frac{dy}{dx}$ (10%)6. Evaluate convergence of $\sum_{x=2}^{\infty} \frac{1}{2\sqrt{x(x-1)}}$ (10%)7. Find $\int_0^1 \frac{e^{2x} - 1}{e^{2x} + 1} dx$ (10%)8. Find the shortest distance from point (2, 5) to the line $3x - 2y - 1 = 0$ (10%)9. Calculate the volume of the solid object generated by rotating the region bounded by the two curves ($y = x^2$ and $y = 4$) around the y axis. (10%)