

科目：微積分 適用：資管系二

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

編號：231

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1. Find the particular solution of $y' = e^x$ determined by the side condition $y(0)=3$. (10 points)

2. Calculate $\int \frac{dx}{\tan x - \sin x}$. (10 points)

3. Given that $y = 2x - 10$, find the values for x and y such that their product is a minimum. (10 points)

4. Evaluate $\int_1^{2\sqrt{x}} \int_0^y y \ln x^2 dy dx$. (10 points)

5. Use mathematical induction to show that

$$\int_0^{\infty} x^n e^{-x} dx = n!, \quad n=1, 2, 3, \dots \quad (10 \text{ points})$$

6. Expand $g(x) = \ln x$ in powers of $x-2$. (10 points)

7. Find $\lim_{x \rightarrow \pi} (x - \pi) \cos^2\left(\frac{1}{x - \pi}\right)$. (10 points)

8. Determine the average value of $f(x) = \sqrt{4x+1}$ on the interval $[0, 2]$ and find a point c in this interval where the function takes on this average value. (10 points)

9. Find the area bounded by $y = \cos \pi x$, $y = \sin \pi x$, $x = \frac{1}{4}$, and $x = \frac{1}{2}$. (10 points)

10. Estimate $\sqrt[4]{14}$ by differentials. (10 points)