

微積分七系共同教學考題

九十四學年度微積分上學期期末考

- 前四題每題十五分, 後四題每題十分。
- 將桌面淨空, 並準備學生證以備查驗。
- 將答案卷對摺, 每頁兩欄書寫(two columns)
- 不可使用含有計算功能之電子儀器設備, 每題作答須有計算或推導過程, 答案卷必須寫上姓名學號科系, 否則一律以零分計。

1. Evaluate

$$\int_0^2 \frac{dx}{x^3}.$$

2. Evaluate

$$\lim_{x \rightarrow 1^+} \left(\frac{1}{\ln x} - \frac{1}{x-1} \right).$$

3. Find

$$\int \frac{5x^2 + 20x + 6}{x^3 + 2x^2 + x} dx.$$

4. Find the arc length of the graph of $f(x) = \frac{1}{2}x^2$ from $x = 0$ to $x = 1$.

5. Find

$$\int x^2 \ln x dx.$$

6. Find the area of the surface formed by revolving the graph of $f(x) = x^2$ on the interval $[0, \sqrt{2}]$ about the y -axis.

7. Find the volume of the solid of revolution formed by revolving the region bounded by $y = x - x^3$ and the x -axis ($0 \leq x \leq 1$) about the y -axis.

8. Find the volume of the solid formed by revolving the region bounded by $f(x) = 2 - x^2$ and $g(x) = 1$ about the line $y = 1$.