

# 微積分五系共同教學考題

九十二學年度微積分上學期期末考

- 第一題爲二十分 第二題至第五題爲每題十五分 最後兩題每題十分
- 每題作答須有計算或推導過程 否則以零分計
- 答案卷務必寫上姓名學號科系 否則以零分計
- 禁止使用含有計算功能之電子儀器設備 否則以零分計
- 請將答案卷對摺 單頁兩欄書寫 (two columns)

1. Let the solid be formed by revolving the region bounded by the graphs of  $y = x^2 + 1$ ,  $y = 0$ ,  $x = 0$ , and  $x = 1$  about the  $y$ -axis.
  - (a) Find the volume of the solid with the disk method.
  - (b) Find the volume of the solid with the shell method.
2. 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.
3. Find the center of mass of the lamina of uniform density  $\rho$  bounded by the graph of  $f(x) = 4 - x^2$  and the  $x$ -axis.

4. Evaluate

$$\int_0^{\pi/2} \cos^4 x \, dx.$$

5. Evaluate

$$\int \frac{x^2 + 5}{x^3 - x^2 + x + 3} \, dx.$$

6. Evaluate

$$\int_1^{\infty} (1-x)e^{-x} \, dx.$$

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

新年快樂