

## 科目：微積分

適用：經濟系二、資管系二、財金系二

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。

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第 1 頁

編號：222、232、242

一、填空题(共 80 分，每空格 10 分，不需列出計算過程)

1. Evaluate the definite integral  $\int_0^2 \frac{x}{(x+1)^2} dx$ .

Answer: \_\_\_\_\_

2. Find the total differential of the function  $f(s, t) = \ln(1 + se^{2t})$ .

Answer: \_\_\_\_\_

3. Evaluate  $\int_0^1 \int_x^{e^x} 3xy^2 dy dx$ .

Answer: \_\_\_\_\_

4. Evaluate  $\int_0^1 \int_0^1 ye^{xy} dx dy$ .

Answer: \_\_\_\_\_

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

Answer: \_\_\_\_\_

6. Evaluate the definite integral  $\int_{-2}^2 \sqrt{4-x^2} dx$ .

Answer: \_\_\_\_\_

7. If  $f(x) = x^{1/3}(4-x)$  on  $[-1, 8]$ , find the absolute maximum.

Answer: \_\_\_\_\_

8. Approximate the function  $f(x) = x^5$  by a Taylor polynomial of degree 2 at  $x=1$ . Answer: \_\_\_\_\_

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二、計算題(共 20 分，沒有列出計算過程者不予計分)

1. (10%) Suppose the demand function for flour in a certain community is given by  $D_1(p_1, p_2) = 500 + \frac{10}{p_1+2} - 5p_2$

while the corresponding demand for bread is given by

$$D_2(p_1, p_2) = 400 - 2p_1 + \frac{7}{p_2+3}$$

where  $p_1$  is the dollar price of a pound of flour and  $p_2$  is the price of a loaf of bread. Determine whether flour and bread are substitute or complementary commodities or neither.

2. (10%) An open rectangular box is to be constructed from material that cost  $\$3/\text{ft}^2$  for the bottom and  $\$1/\text{ft}^2$  for its sides. Find the dimensions of the box of greatest volume that can be constructed for  $\$36$ .

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