

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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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 $f(x) = x^{1/3}(4-x)$, 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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