

科目：微積分

適用：財金系

編號：344

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。

本試題

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一、 填空题(共 80 分，每空格 8 分，不需列出計算過程)

1. Suppose  $h = f \circ g$ . Given that  $f(0) = 2, f'(4) = -3, g(0) = 4,$  $g'(0) = 5$ . Find  $h'(0) =$  \_\_\_\_\_

2. Find an equation of the tangent line to the graph of the function

 $f(x) = (5 - x)(x^2 - 5)^2$  at the point  $(2,3)$ . Ans: \_\_\_\_\_

3. Use the least squares criterion to find the equation of the line that is

closest to the three points  $(1,1), (2,3)$ , and  $(4,3)$ .

Ans: \_\_\_\_\_

4. Find the area of the region R bounded by the curves  $y = x^3$  and  $y = x^2$ .

Ans: \_\_\_\_\_

5. Find the general solution of the differential equation

$$\frac{dy}{dx} = x^2 + 3x$$

and the particular solution that satisfies  $y = 2$  when  $x = 1$ .

Ans: \_\_\_\_\_

6. Evaluate the double integral

$$\iint_R x e^{-y} dA$$

Where R is the rectangular region  $-2 \leq x \leq 1, 0 \leq y \leq 5$ .

Ans: \_\_\_\_\_

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7. Find the sum of the series  $\sum_{n=1}^{\infty} \frac{(-2)^n}{3^{n+1}} =$  \_\_\_\_\_

8. Evaluate  $\int_1^2 \pi(2 - \frac{1}{2}x)^2 dx =$  \_\_\_\_\_

9.  $\lim_{x \rightarrow \infty} (1 + \frac{1}{x})^x =$  \_\_\_\_\_

10. Find the derivatives of  $f(x) = \ln x^3 + (\ln \frac{1}{x})^3$ .

$f'(x) =$  \_\_\_\_\_

二、計算題(共 20 分，沒有列出計算過程者不予計分)

1. (10%) Find the absolute extrema of the function

$f(x) = \frac{x}{x^2+1}$  on  $[1, 3]$ .

2. (10%) Evaluate the double integral  $\int_R \int f(x, y) dA$  for the function

$f(x, y)$  and the region  $R$ ,  $f(x, y) = xe^{xy}$ ;  $R$  is the rectangular region

$0 \leq x \leq 2, 0 \leq y \leq 1$ .

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