

東海大學 101 學年度碩士班招生入學考試試題

考試科目：微積分 C

應考系所：國貿系

本試題共 2 頁：第 1 頁

(如有缺損或印刷不清者，應即舉手請監試人員處理)

答案寫在試題紙上，收回試題紙

(一) 填充題 (填入下列 $f(x)$ 的微分 $f'(x)$ 和積分 $F(x)$, 每格 5 分)

$$f'(x) = \frac{d}{dx} f(x) \text{ and } \int f(x) = F(x) + c \quad (40\%)$$

$f(x)$	$f'(x)$	$F(x)$
$\frac{x}{x+1}$		
$x\sqrt{x+1}$		
e^x		
$\ln x$		

(二) 選擇題 (可複選, 每題 5 分)

(1) $f(x) = \sqrt{2 - x - x^2}$

i. Where is the tangent line of $f(x)$ horizontal (切線是平的, 微分值等於零的地方)?

(A) $x = -2$ (B) $x = 1$ (C) $x = -\frac{1}{2}$ (D) $x = -1$. () (5%)

ii. Where is the tangent line of $f(x)$ vertical (切線是垂直的, 微分值等於無窮大的地方)?

(A) $x = -2$ (B) $x = 1$ (C) $x = -\frac{1}{2}$ (D) $x = -1$. () (5%)

(2) If the demand (需求) x of a particular commodity is

$$x(p) = \frac{10,000}{0.4p^2 + 10} \quad (\text{units}),$$

where p is the unit price (單價), the maximum revenue (收入) can be obtained when

(A) $p = 3$ (B) $p = 5$ (C) $p = 9$ (D) $p = 10$. () (5%)

(3) Find all the inflection points (反曲點) of the function $f(x) = x^{1/3}(x - 4)$.

(A) $x = -2$ (B) $x = 1$ (C) $x = -\frac{1}{2}$ (D) $x = -1$. () (5%)

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- (4) If \$1000 is invested at an annual interest rate of 6% compounded monthly,
- what is the effective rate (實際利率)?
(A) $1.06^{12} - 1$ (B) 0.06 (C) 1.005^{12} (D) $1.005^{12} - 1$. () (5%)
 - what is the balance (本利和) after 10 years?
(A) 1000 (1.06^{12}) (B) 1600 (C) 1000 (1.005^{120}) (D) $1000(1.005^{120} - 1)$. () (5%)
- (5) A car is traveling along a straight (直的) road at 66 ft/sec when the driver is forced to apply the brakes (煞車) to avoid an accident. If the brakes supply a constant deceleration (減速) of 22 ft/sec^2 , how far does the car travel before it stops?
(A) 50 ft (B) 65 ft (C) 82 ft (D) 99 ft () (5%)
- (6) The marginal cost (邊際成本) of a certain commodity is $4(x - 1)^3$ dollars per unit, when the level of production (產量) is x units. By how much will the total cost increase if the production is raised from $x = 6$ to $x = 11$ units.
(A) \$8375 (B) \$8875 (C) \$9375 (D) \$9875. () (5%)
- (7) Find the area of the region enclosed by the line $y = 4x$ and the curve $y = x^3 + 3x^2$.
(A) 20 (B) $24\frac{1}{4}$ (C) $28\frac{1}{2}$ (D) $32\frac{3}{4}$. () (5%)
- (8) The Lorentz curves for the distribution of income (收入分佈) for dentists (牙醫) and contractors (承包商) in a certain state are respectively $L_1(x) = x^{1.7}$ and $L_2(x) = x^{1.8}$. For which profession (職業) is the distribution of income more fairly (公平) distributed?
(A) dentists (B) contractors (C) equally fair () (5%)
- (9) If the sales of a product, t month after introducing the product to the market, are

$$S(t) = \frac{750t}{\sqrt{4t^2 + 25}} \quad (\text{thousand dollars}).$$

What are the average monthly sales over the first 6 months?

- (A) 225 (B) 250 (C) 275 (D) 300 (thousand dollars). () (5%)
- (10) Decide between the following two investments. The first costs \$1,000 and generates a continuous income stream at the rate of $f_1(t) = 3,000e^{0.03t}$ dollars per year. The second costs \$3,000 and generates income at a constant rate of $f_2(t) = 3,500$ dollars per year. If the annual interest rate remains fixed at 5% compounded continuously over the next 5 years. Which investment is better over this time period? Hint: $e^{-0.1} = 0.9048$, $e^{-0.25} = 0.7788$
(A) The first one is better. (B) The second one is better. () (5%)