

世新大學 101 學年度二年級轉學生招生考試試題卷

第 1 頁共計 2 頁

系所組別	考 試 科 目
經濟學系二年級	微積分

※本考題 ☒ 可使用 ☐ 禁止使用 簡易型電子計算機

※考生請於答案卷內作答

I. Selection (35%)

1. (9%) Find the indicated limit.

1.1 () $\lim_{x \rightarrow -1} \frac{x^2 - 1}{x + 1}$ ① does not exist ② -1/2 ③ 0 ④ -2 ⑤ 2

1.2 () $\lim_{x \rightarrow 0} \frac{x^2 - x}{2x}$ ① does not exist ② -1/2 ③ 0 ④ -2 ⑤ 2

1.3 () $\lim_{x \rightarrow \infty} \frac{4x^4 - 3x^2 + 1}{2x^4 + x^3 + x^2 + x + 1}$ ① does not exist ② -1/2 ③ 0 ④ -2 ⑤ 2

2. (9%) Find the derivative of the given function

2.1 () $f(x) = \frac{x(1+x)(2+x)\dots(n+x)}{(1-x)(2-x)\dots(n-x)}$, $f'(0) = ?$ ① 810 ② -10 ③ does not exist ④ 2 ⑤ 1

2.2 () $\int_1^8 \left(\sqrt[3]{x} - \frac{1}{\sqrt[3]{x}} \right) dx$ ① $\frac{19}{5}$ ② $\frac{27}{4}$ ③ $\frac{5}{19}$ ④ $\frac{4}{27}$ ⑤ 1

2.3 () $\int_0^2 x e^{x^2+2} dx$ ① $\frac{1}{3}e^9 - \frac{1}{3}$ ② $\frac{1}{2}e^6 - \frac{1}{2}e^2$ ③ 1 ④ 2/3

3. (9%) Evaluate the definite integral.

3.1 () $\int_1^e \ln x \, dx$ ① e ② 1 ③ does not exist ④ 10 ⑤ 56/3

3.2 () $\int_{-\infty}^{\infty} e^{-x} \, dx$ ① e ② 1 ③ does not exist ④ 10 ⑤ 56/3

3.3 () $\int_1^3 2x^2 \, dx$ ① e ② 1 ③ does not exist ④ 10 ⑤ 56/3

4. (8%) Evaluate the double integral $\iint_R f(x, y) dA$ for the function $f(x, y)$ and the region

R .

4.1 () $f(x, y) = xy^2$; R is the rectangle defined by $-1 \leq x \leq 1$ and $0 \leq y \leq 1$

① e ② 1 ③ 2 ④ 0 ⑤ 56

4.2 () $f(x, y) = 2x + 4y$; R is bounded by $x = 1$, $x = 3$, $y = 0$, and $y = x + 1$.

① 5/188 ② 1 ③ 3/188 ④ 188/5 ⑤ 188/3

轉後頁

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第 2 頁共計 2 頁

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II. Calculation (65%)

1. (30%)

a) Using the differentials to approximate the given quantity: $\sqrt{26.5}$

b) Also, obtain the second Taylor polynomials of $f(x) = \sqrt{x}$ at $x = 25$ and use it to approximating the value of $\sqrt{26.5}$.

c) The exact value of $\sqrt{26.5}$, rounded off to five decimal places, is 5.14782. Please compare results in a) and b).

2. (20%) Determine the relative extrema(s) and/or inflection point(s) of the function $f(x) = 4x^3 - 3x^4$ using the first or second derivative test.

3. (15%) $P(x, y) = -\frac{1}{4}x^2 - \frac{3}{8}y^2 - \frac{1}{4}xy + 120x + 100y - 5000$ is a total weekly profit function for a company. x and y are two products produced and sold per week. The production process is restricted to a total of exactly 230 units each week ($x + y \leq 230$). How many x and y should be produced to maximize weekly profit for the company?