世新大學 98 學年度二年級轉學生招生考試試題卷

系 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 (47%)

1. Find the indicated limit. (9%)

1.1( ) $\lim_{x\to -5}\frac{x^2-25}{x+5}$ ① does not exist ② 1 ③ 0 ④-10 ⑤ 2

1.2 ( ) $\lim_{x\to 2}\frac{x+2}{x-2}$ ① does not exist ② 1 ③ 0 ④-10 ⑤ 2

1.3 ( ) $\lim_{x\to -\infty}\frac{4x^4-3x^2+1}{2x^4+x^3+x^2+x+1}$ ① does not exist ② 1 ③ 0 ④-10 ⑤ 2

2. Evaluate the definite integral. (16%)

2.1 ( ) $\int_{-1}^{3}2x^2dx$ ① 56/3 ② 1 ③ 8/3 ④10

2.2 ( ) $\int_{1}^{e}\ln x\,dx$ ① 56/3 ② 1 ③ 8/3 ④10

2.3 ( ) $\int_{1}^{2}\frac{x^2+2x}{x^3+3x^2-1}dx$ ① 19/15 ② (ln19-ln13)/3 ③ 10 ④ (ln19-ln3)/3

2.4 ( ) $\int_{-1}^{1}\frac{x^5+x^4+x^3+x^2}{x^2+1}dx$ ① 3/2 ② 1/3 ③ 1 ④ 2/3

3. Find the absolute maximum value, if any, of the given function f(x). (10%)

3.1 ( ) f(x)= $-x^2+4x+6$ on [0, 5] ① 2 ② 6 ③ 10 ④ no proper answer

3.2 ( ) f(x)= $\frac{x}{\sqrt{x^2+1}}$ on [-1, 1] ① $\sqrt{2}/2$ ② 1 ③ -1 ④ no proper answer

4. In the following questions, determine whether the series converges or diverges. If it converges, find its sum. (12%)

4.1 ( ) $\sum_{n=1}^{\infty}(-2)^n$ ① converge, 2 ② diverge, 6 ③ converge, 10 ④ diverge, does not exist

4.2 ( ) $\sum_{n=1}^{\infty}\frac{1}{n^2+3n+2}$ ① converge, 2 ② diverge, 0 ③ converge, 1/2 ④ diverge, does not exist

4.3 ( ) $\sum_{n=1}^{\infty}3(0.9)^n$ ① converge, 30 ② diverge, 0 ③ converge, 2.7 ④ diverge, does not exist

轉後頁

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II. Find the derivative of the given functions. (16%)

2.1 $f(x)=(x^3-1)(x+1)$. find f '(x)

2.2 $f(x)=\frac{x}{x^2+x+1}$ find f '(x)

2.3 $f(t)=\frac{4}{\sqrt[3]{2t^2+t}}$. find f '(t)

2.4 $f(x)=\frac{x(1+x)(2+x)...(n+x)}{(1-x)(2-x)...(n-x)}$, find f '(0)

III. Evaluate $\iint_R f(x,y)dA$, where $f(x,y)=xe^y$ and R is the plane region bounded by the graph of $y=x^2$ and $y=x$. (12%)

IV. Taiwan Semiconductor Manufacturing Company, a manufacturer of semiconductor, finds that it takes x units of labor and y units of capital to produce

$$f(x, y)=100x^{3/4}y^{1/4}$$

units of the product. If a unit of labor costs \$100, a unit of capital costs \$200, and \$200,000 is budgeted for production, determine how many units should be expended on labor and how many should be expended on capital in order to maximize production. (15%)

V. Find the 4th Taylor polynomial of the function $f(x)=\ln x$ at x=1. (10%)