國立臺北大學 106 學年度學士班暨進修學士班轉學生招生考試試題

系別：經濟學系 2 年級(學士班、進修學士班)　　考試時間：80 分鐘

科目：微積分　　第 1 頁，共 1 頁

☑可 ☐不可 使用計算機

I. (50 points) Fill in the following blanks.

1. The value of $\lim_{x\to 0}\dfrac{\sqrt{3+x}-\sqrt{3}}{x}$ is _____(1)_____.

2. Using implicit differentiation, we can obtain the tangent line to the curve $\sin x+\cos y=1$ at point $\left(\dfrac{\pi}{2},\dfrac{\pi}{2}\right)$, i.e., _____(2)_____.

3. Suppose $F(x)=f(g(x))$, where $f(-2)=8$, $f'(-2)=4$, $f'(5)=3$, $g(5)=-2$, $g'(5)=6$. Then $F'(5)=$_____(3)_____.

4. Suppose function $f(x)=\begin{cases} cx^2+2x, & \text{if } x<2 \\ 2x+4, & \text{if } x\geq 2 \end{cases}$ is continuous on $(-\infty,\infty)$. Then, the value of constant c is _____(4)_____.

5. Function $f(x)=x^3e^x$ is strictly increasing on the interval of _____(5)_____.

6. The derivative of $f(x)=(\cos x)^x$ is _____(6)_____.

7. Evaluate $\int_1^{e^2}\left(\dfrac{\ln^2 x}{x}\right)dx=$ _____(7)_____.

8. Suppose $y=3x-7$ and $x\geq 0$. Then, the minimum value of x^2y is _____(8)_____, and the maximum value of x^2y is _____(9)_____.

9. Let $f(x)=\dfrac{|x^2-1|}{x-1}$. Then, f has a local maximum at $x=$ _____(10)_____.

II. (50 points) Fill in the following blanks.

1. If $k(s)=\dfrac{\ln s}{s^2}$, then $k'(s)=$ _____(1)_____.

2. The area of the region bounded by the curves $y=x^3+1$ and $y=-x^2$ from $x=0$ to $x=2$ is equal to _____(2)_____.

3. Given $p>0$, the series of $\sum_{n=1}^{\infty}p^n n^p$ will diverge when the values of p is _____(3)_____.

4. Use quadratic Taylor's expansion to approximate the Cobb-Douglas function $f(x_1,x_2)=x_1^{1/4}x_2^{3/4}$ at point (1, 1). Then, $f(1.1,0.9)$ equals _____(4)_____.

5. Let $f(x_1,x_2)=\begin{cases} 2e^{-x_1-2x_2}, & x_1>0,\ x_2>0; \\ 0, & \textit{otherwise.} \end{cases}$ Suppose $y=x_1+x_2$. Then, $f(y)=$ _____(5)_____.

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