

國立臺北大學 107 學年度日間學士班暨進修學士班轉學生招生考試試題

系 別：經濟學系日間學士班暨進修學士班 2 年級

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 $\lim_{x \rightarrow 1} \frac{x^3 - x^2}{x^2 - 1}$ is _____ (1).
2. The tangent line to the curve $x^2 + xy - y^2 = 1$ at point (2, 3) is _____ (2).
3. If $y = \frac{2\sqrt{x}}{3(1+\sqrt{x})}$, then $\frac{dy}{dx} =$ _____ (3).
4. Let $f(x) = \frac{2x-1}{8-7x}$, then $f^{-1}(1) =$ _____ (4).
5. Let $f(x) = 2x^{5/3} - 5x^{4/3}$, then f is decreasing on the interval of _____ (5).
6. The absolute maximum value of $f(x) = \frac{x+1}{x^2+x+9}$ on the interval of $[0, \infty)$ is _____ (6).
7. The value of $\int_0^1 x\sqrt{1-x} dx$ is _____ (7).
8. The value of $\int_0^\infty \frac{dx}{1+e^x} =$ _____ (8).
9. Does series $\sum_{n=1}^\infty \frac{5^n - 2^n}{7^n - 6^n}$ converge or diverge? _____ (9)
10. Is $A = \sum_{n=0}^\infty \frac{(-1)^n}{2^n}$ or $B = \sum_{n=1}^\infty \frac{1}{n2^n}$ smaller? _____ (10)

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

1. Use the first three terms of the Taylor series to approximate $f(x) = \cos(5x)$ at $x = 0$. Then, the result is _____ (1).
2. If y is a differentiable function of x satisfying equation $\int_0^{x+y} e^{-t^2} dt = xy$, then $\left. \frac{d^2y}{dx^2} \right|_{(x,y)=(0,0)} =$ _____ (2).
3. The value of $\lim_{x \rightarrow 0} \left(\frac{\sin x}{x} \right)^{1/x^2}$ is _____ (3).
4. Let $u = x + y + z$, $v = xy + yz + zx$, $w = xyz$, and suppose that $f(u, v, w)$ is a differentiable function satisfying $f(u, v, w) = x^4 + y^4 + z^4$ for all (x, y, z) . Then, $f_u(2, -1, -2) =$ _____ (4).
5. The value of $\int_0^2 \int_0^{\sqrt{2y-y^2}} \frac{xy}{x^2+y^2} dx dy$ is _____ (5).

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