# 東吳大學 107 學年度暑假轉學生招生考試試題



| 系級 | 資訊管理學系二年級 | 考試時間 | 100 分鐘 |
|---|---|---|---|
| 科目 | 微積分 | 本科總分 | 100 分 |

1 For $f(x) = e^x \sqrt{x^2 + 2x}$, find (a) the equation of the secant line through points whose $x$ coordinates are 0 and 2, (b) the equation of the tangent line when $x = -2$. (20%)

2 Find the derivative of $f(x) = \ln x^2 e^{3x^3}$. (10%)

3 For $f(x) = \dfrac{x^2 - 25}{x - 5}$, find all $a$-values where $f(x)$ is discontinuous. (a) For each such value $a$, give

$f(a) =$_____ and (b) $\lim\limits_{x \to a} f(x) =$ _____ (20%)

4 Let the demand and supply functions for $q$ units of a certain item be $p = D(q) = \dfrac{5q^2 - 1515}{(q + 1)^2}$ and

$p = S(q) = \dfrac{47q + 96}{10(q + 1)}$, $q > 1$, where $p$ is in dollars. Its cost function is $C(q) = \dfrac{4q^2 + 141q - 900}{q + 1}$.

Find (a) equilibrium quantity; (b) break-even quantity. (20%)

5 Find two nonnegative numbers $x$ and $y$ for which $4x + y = 50$, such that $x^2y$ is maximized. (10%)

6 Suppose income from an investment starts (at time 0) at \$5500 a year and increases linearly and continuously at a rate of \$400 a year. Find the capital value at an interest rate of 5% compounded continuously. (10%)

7. Find $\lim\limits_{x \to 0} \dfrac{1 + \frac{2}{5}x - (1 + x)^{2/5}}{x^2}$ (10%)