准考證號碼：□□□□□□ （請考生自行填寫）

財務金融系碩士班　　　　筆試科目:微積分　　　共 2 頁，第 1 頁

注意事項	1. 本科目合計 100 分，答錯不倒扣。
	2. 請於答案卷上依序作答，並標註清楚題號（含小題）。
	3. 考完請將答案卷及試題一併繳回。

1. $\lim_{x \to \infty}\left(1+\dfrac{a}{x}\right)^{bx} = ?$ [10 points]

2. $\dfrac{d}{dx}2^{3^x} = ?$ [20 points]

3. $\displaystyle\int\dfrac{1}{1+e^{-x}}dx = ?$ [20 points]

4. For the initial value problem $y'(t) = -y + 3t$ and $y(0) = 4$, find the Euler approximation to the solution on the interval $[0, \dfrac{3}{2}]$ using $n = 3$ segments. Show the approximation to the solution at $x = \dfrac{3}{2}$. [10 points]

5. The demand function is given by $P = \dfrac{50}{1+0.01Q^2}, 0 \le Q \le 20$, where P is the unit price in dollars and Q is the quantity demand per month.

(1) Find the consumers' surplus using the Trapezoidal Rule with $n = 8$ if the market price is $25. [10 points]

(2) Find the consumers' surplus using the Simpson's Rule with $n = 8$ if the market price is $25. [10 points]

背面尚有試題

6. Let $W(t)$ be the amount in a fund earning interest at the annual rate of r, compounded continuously. A continuous cash flow of At dollars per year is distributed to the fund, where t is the time in years. The rate of change of W is given by $W'(t) = At + rW$, where $W = 0$ when $t = 0$. Solve this differential equation for $W(t)$ as a function of t. [10 points]

7. Based on the logistic growth model, the relative rate of growth is modeled as follows: $\frac{g'(t)}{g(t)} = k(L - g(t))$, where $k > 0$ is the constant of proportionality, $0 < g < L$ and L is called the carrying capacity. Solve the differential equation for $g(t)$ as a function of t. [10 points]

試題結束