

國立臺北商業技術學院 100 學年度研究所碩士班考試入學試題

准考證號碼：□□□□□□ (請考生自行填寫)

財務金融研究所

筆試科目：微積分

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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。
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1. The call option price is  $C = SN(d_1) - Ke^{-rT}N(d_2)$ , where  $d_1 = \frac{\ln(\frac{S}{K}) + (r + \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}$ ,

and  $d_2 = \frac{\ln(\frac{S}{K}) + (r - \frac{1}{2}\sigma^2)T}{\sigma\sqrt{T}}$ ;  $r, \sigma, K$  and  $T$  are constant. The function  $N(x)$

is the probability that a standard normal random variable is less than  $x$  (i.e.

$N(x) = \int_{-\infty}^x \frac{1}{\sqrt{2\pi}} e^{-\frac{y^2}{2}} dy$ ). Please show that  $\frac{\partial C}{\partial S} = N(d_1)$ . [10 points]

2. Integral can be valued using numerical methods of integration. (a) Please use the Trapezoidal rule with  $n=10$  to approximate  $\int_1^3 \frac{1}{x} dx$ . [10 points] (b) Please estimate

the accuracy of approximation of  $\int_1^3 \frac{1}{x} dx$  by the Trapezoidal rule with  $n=10$  using the error estimate formula. [10 points]

3. (a) Solve the differential equation  $\frac{dy}{dt} = ky(1 - \frac{y}{L})$ . [10 points] (b)  $y=1$  when  $x=1$ ;

please solve the differential equation  $(\frac{dy}{dx} - 1)x = y$  [10 points]

4.  $\lim_{n \rightarrow \infty} (3^n + 5^n + 7^n)^{\frac{1}{n}} = ?$  [10 points]

5. Suppose that  $y = (x^2 + 1)^{e^x}$ . Please find  $\frac{dy}{dx}$ . [10 points]

背面尚有試題

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6. Suppose that  $f(x) = \int_x^{x^2} e^{t^2} dt$ . Please find  $f'(3)$ . [10 points]

7. Solve the following problem:  $\frac{dy}{dt} + 2ty = y$ ,  $y(0) = 5$ . [10 points]

8.  $\int_0^2 \int_y^2 e^{x^2} dx dy = ?$  [10 points]

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