

東吳大學 104 學年度轉學生(含進修學士班轉學生)招生考試試題

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| 系級 | 財務工程與精算數學系二年級 | 考試時間 | 100 分鐘 |
| 科目 | 微積分           | 本科總分 | 100 分  |

要有演算過程或寫出理由, 否則扣分.

1. (15%) Evaluate the limit.

$$\lim_{x \rightarrow 3} \left( \frac{1}{x-3} \int_3^x \frac{\sin t}{t} dt \right)$$

2. (10%) Show that there is at least one root of the equation (方程式)  $\sin x - x + 2 = 0$  in the interval  $(0, \frac{3\pi}{2})$ .

3. (15%) Evaluate the indefinite integral.

$$\int \cos(\ln x) dx$$

4. (15%) The region bounded by the graphs of  $y = e^x$ ,  $y = 0$ ,  $x = 0$ , and  $x = 1$  is revolved (旋轉) about the  $x$ -axis. Find the volume of the resulting solid.

5. (15%) Find the radius (半徑) of convergence and interval (區間) of convergence of the power series.

$$\sum_{n=1}^{\infty} \frac{(x + \pi)^n}{\sqrt{n}}$$

6. (15%) Evaluate the double integral.

$$\int_0^8 \int_{\sqrt[3]{x}}^2 \frac{1}{y^4 + 1} dy dx$$

7. (15%) Find the local maximum and minimum values and saddle point(s) (鞍點) of the function

$$f(x, y) = -xye^{-(x^2+y^2)/2}.$$