

國立中央大學103學年度碩士班考試入學試題卷

所別：大氣科學學系大氣物理碩士班 不分組(一般生) 科目：應用數學 共  /  頁 第  /  頁  
大氣科學學系大氣物理碩士班 不分組(在職生)

本科考試禁用計算器

\*請在試卷答案卷(卡)內作答

1. Please solve the following initial value problem.

$$e^{2x} (2 \cos y dx - \sin y dy) = 0 \quad y(0) = 0 \quad (10\%)$$

2. Please find a general solution of the following system of ordinary differential equations.

$$\begin{cases} y_1' = 2y_1 + 5y_2 \\ y_2' = 5y_1 + 12.5y_2 \end{cases} \quad (15\%)$$

3. Please solve the following linear system.

$$\begin{cases} 4y + z = 0 \\ 12x - 5y - 3z = 34 \\ -6x + 4z = 8 \end{cases} \quad (15\%)$$

4. 請利用 divergence 定理來計算下列面積分(surface integral)  $\iint_S \mathbf{F} \cdot \mathbf{n} dA$ ，其中

$$\mathbf{F} = [\sin y, \cos x, \cos z] \text{ 而 } S \text{ 是由 } x^2 + y^2 \leq 4 \text{ 和 } |z| \leq 2 \text{ 所組成的面。} \quad (15\%)$$

5. Please find the Laplace transform of the following functions)。

a.  $te^{at}$  ;  
 b.  $b \sin \omega t * \cos \omega t$  (10%)

6. Please find the corresponding Taylor series and associated radius of convergence of the following functions)。

a.  $\frac{1}{1-z}$ ,  $z_0 = 0$   
 b.  $\sinh(2z-i)$ ,  $z_0 = \frac{i}{2}$  (20%)

7. Please find the corresponding Fourier series of the following function.

$$f(x) = x^2, \quad -1 < x < 1, \quad \text{period} = 2 \quad (15\%)$$

參考用