

系別：航空太空工程學系

科目：工 程 數 學

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| 准帶項目請打「V」 |        |
| ✓         | 簡單型計算機 |

本試題共 1 頁，6 大題

1. Use the Laplace transform method to solve the given initial-value problem,  $y$  is a function of  $t$

$$y'' + y = \sin t, \quad y(0) = 1, \quad y'(0) = -1 \quad (20\%)$$

2. Use Gaussian elimination or Gauss-Jordan elimination to solve the given system of equations,

$$\begin{aligned} x_1 + 2x_2 - x_3 &= 0 \\ 2x_1 + x_2 + 2x_3 &= 9 \\ x_1 - x_2 + x_3 &= 3 \end{aligned} \quad (20\%)$$

3. Solve the given non-homogeneous differential equation,  $y$  is a function of  $x$

$$y'' + 4y' - 2y = 2x^2 - 3x + 6 \quad (15\%)$$

4. Find the eigenvalues and eigenvectors of  $A = \begin{bmatrix} 9 & 1 & 1 \\ 1 & 9 & 1 \\ 1 & 1 & 9 \end{bmatrix}$  (15%)

5. Find the general solutions of the given system of first-order ordinary differential equations,  $X$  is a function of  $t$ ,

$$X' = \begin{bmatrix} 1 & -1 & 2 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} X, \quad (15\%)$$

6. Use the power series method to find the general solution of the ordinary differential equation  $y'' - (1+x)y = 0$ ,  $y$  is a function of  $x$ .

(15%)