

大同大學 101 學年度轉學入學考試試題

考試科目：工程數學

所別：電機工程學系

第 1/1 頁

註：本次考試 不可以參考自己的書籍及筆記；不可以使用字典；不可以使用計算器。

1. (20%) Solve the following system by Gauss-Jordan elimination.

$$\begin{aligned}x_1 + 3x_2 - 2x_3 + 2x_5 &= 0 \\2x_1 + 6x_2 - 5x_3 - 2x_4 + 4x_5 - 3x_6 &= -1 \\5x_3 + 10x_4 + 15x_6 &= 5 \\2x_1 + 6x_2 + 8x_4 + 4x_5 + 18x_6 &= 6\end{aligned}$$

2. For the following matrix A

$$A = \begin{bmatrix} 0 & 0 & -2 \\ 1 & 2 & 1 \\ 1 & 0 & 3 \end{bmatrix}$$

Find

- (5%) the characteristic equation of A
 - (5%) the eigenvalues of A
 - (10%) the eigenvectors corresponding to each of the eigenvalues of A .
 - (5%) the eigenvalues of A^7
3. (15%) Solve the general solution for the following differential equation

$$\frac{dy}{dt} = y^{1/3}$$

where $y(0) = 0$.

4. (20%) Solve the general solution for the following differential equation

$$\frac{d^2y}{dt^2} + 9y = -4t \sin(3t)$$

5. (20%) Find Fourier series expansion for the following function:

$$f(x) = \begin{cases} 0 & -3 \leq x \leq 0 \\ x & 0 \leq x \leq 3 \end{cases}$$