大同大學 103 學年度轉學入學考試試題

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%) Find the inverse of

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$

using row operations (Hint: $[A \mid I] \Rightarrow [I \mid A^{-1}]$).

2. Find (15%) a basis and (5%) nullity for the nullspace of

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

(Hint: using row operations)

3. (20%) Solve the general solution for the following differential equation

$$\frac{dy}{dx} - y = 2e^x$$

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

$$x\frac{dy}{dx} = \frac{y^2}{x} + y$$

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

$$f(x) = x \quad \text{for} \ -4 \le x \le 4$$