淡江大學 106 學年度碩士班招生考試試題 17-1

系別：電機工程學系　　科目：工程數學

機器人工程碩士班 A 組

考試日期：3 月 4 日(星期六) 第 1 節　　本試題共 4 大題， 1 頁

1. Consider the linear system Ax=b given by $\begin{bmatrix} 1 & 0 & 3 \\ 2 & 1 & 5 \\ 4 & 1 & s \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} 5 \\ 8 \\ t \end{bmatrix}$. If the matrix A is not invertible, what is the value of s? Apply this value of *s* and find the value of *t* that makes the linear system Ax=b have a solution. (25%)

2. Please determine all the eigenvalues and eigenvectors of the following 3×3 matrix A. (25%)

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

3. If $P = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 8 & 7 & 6 & 5 \\ 9 & 10 & 11 & 12 \\ 16 & 15 & 14 & 13 \end{bmatrix}$, then rank(P)=? (25%)

4. (25%) Solve the following differential equation.

$$\frac{dy}{dx} - 2x + 1 = 0$$