國立彰化師範大學108學年度碩士班招生考試試題

系所： 數學系(選考甲)、
　　　統計資訊研究所(選考甲)

科目： 線性代數

1. Find a basis for C^n over the field R of all real numbers. (20%)

2. Find an orthonormal basis for W=sp{[1, 2, 3, 0], [1, 2, 0, 0], [1, 0, 0, 1]} of R^4 .(20%)

3. Find an orthogonal substitution that diagonalizes the quadratic form $2xy + 2yz$.(20%)

4. Prove that det(A)= $\prod_{1 \le i < j \le 5}(x_j - x_i)$, where $x_1, x_2, x_3, x_4, x_5 \in R$ and

$$A= \begin{bmatrix} 1 & x_1 & x_1^2 & x_1^3 & x_1^4 \\ 1 & x_2 & x_2^2 & x_2^3 & x_2^4 \\ 1 & x_3 & x_3^2 & x_3^3 & x_3^4 \\ 1 & x_4 & x_4^2 & x_4^3 & x_4^4 \\ 1 & x_5 & x_5^2 & x_5^3 & x_5^4 \end{bmatrix}.$$　　　　　(20%)

5. Find an invertible matrix P and a diagonal matrix D such that $P^{-1}BP = D$, where

$$B = \begin{bmatrix} 2 & 0 & 0 \\ 1 & 2 & 1 \\ -1 & 0 & 1 \end{bmatrix}.$$　　　　　(20%)