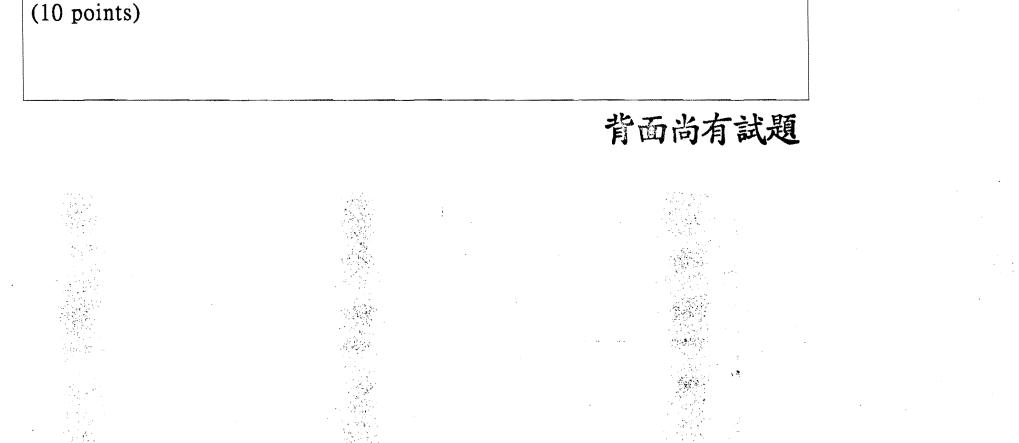
淡江大學107學年度日間部轉學生招生考試試題 數學學系數學組三年級 科目:線性代數 22-系 别: 本試題共 7 大題,2 頁 考試日期:7月27日(星期五) 第1節 #務必書寫過計算程,否則不予計分。 1. Let  $A = \begin{bmatrix} 6 & -5 \\ 2 & -1 \end{bmatrix}$ . (1) Find characteristic polynomial of A. (5 Points) (2) Find all eigenvalues and eigenvectors of A. (5Points) Find an invertible matrix P such that  $P^{-1}AP = D$  is a diagonal matrix. (3) (5Points) Find  $A^{10}$ . (5 points) (4) 2. Let P =  $\begin{bmatrix} 1 & 1 & 0 \\ 0 & 2 & 1 \\ 0 & 0 & -1 \end{bmatrix}$ . Show that P is invertible and find  $P^{-1}$ . (15 points) 3. Let M be the vector space of all  $2 \times 2$  matrices. Let A =  $\begin{bmatrix} 1 & 1 \\ 0 & 0 \end{bmatrix}$  and let  $U={X in M | AX=XA}.$ (1) Show that U is a subspace of M. (5points) (2) Find a basis for U. (5points) 4. Let  $a_1 = (0,1,1), a_2 = (1,1,0), a_3 = (0,1,0)$ . Show that  $S = \{a_1, a_2, a_3\}$  form a basis for  $R^3$ .

本試題雙面印刷



淡江大學 107 學年度日間部轉學生招生考試試題 <sup>条</sup> 別: 數學學系數學組三年級 科目:線性代數 考試日期:7月27日(星期五)第1節 本試題共 7 大題・2頁 5. Let  $u_1 = (1,1)$  and  $u_2 = (1, -1)$ , and let T:  $R^2 \rightarrow R^2$  be the linear operator such that  $T(u_1) = (1, -2)$  and  $T(u_2) = (-4, 1)$ Find a formula for T(x, y). (15 points) 6. Let  $A = \begin{bmatrix} 1 & -1 & 0 & 2 \\ 0 & -2 & 2 & 4 \\ 1 & -1 & 0 & 3 \end{bmatrix}$  be 3×4 matrix. (20 points) (a) Show that AX=Y is consistent for all 3×1 matrix Y. (b) Find a basis for the solution space of AX=0.

7. Let A be m×n and B be n×m matrices. Prove that if m<n, then BA is not invertible.</li>(10 points)

