

國立屏東教育大學 100 學年度學士班轉學考試

線性代數 試題

(應用數學系)

*注意事項：

- (1) 本試題共 1 頁，答案請「橫式」書寫，並依規定上下翻頁，否則不予計分。
(2) 不必抄題，但請依序將題號標出，並寫在答案紙上。

每題 10 分

- 1、Suppose that $\{v_1, v_2, v_3\}$ is linear independent. Show that $\{v_2 + v_3, v_1 + v_3, v_1 + v_2\}$ is also linear independent.
2、Let $T: R^2 \rightarrow R^2$ be the linear transformation $T(x, y) = (y - x, x + y)$. Find the image of $\frac{1}{4}x^2 + y^2 = 1$.

- 3、Find the inverse of the matrix $\begin{pmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{pmatrix}$.

- 4、Given a 2×2 matrix $A = \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix}$. Find A^n for any positive integer n .

- 5、Find the eigenvalues and eigenvectors of the following matrix

$$\begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$$

- 6、Determine whether the vector $\{(1, 1, 1), (1, 1, 0), (1, 0, 0)\}$ form a basis for R^3 .

- 7、Find the rank of the matrix $\begin{bmatrix} 1 & -1 & 2 \\ 3 & 1 & -1 \\ 2 & 2 & -3 \end{bmatrix}$

- 8、If A is a invertible matrix, then $\det(A) = 1/\det(A^{-1})$

- 9、If $f(x) = x^3 - 2x^2 + x - 2$, then evaluate $f(F)$, where $F = \begin{bmatrix} 1 & 2 \\ -3 & -4 \end{bmatrix}$.

- 10、Prove or Disprove: Let A, B be $n \times n$ matrixes,

(1) $\det(A + B) = \det A + \det B$ (2) $\det(kA) = k \cdot \det A$, where k is a constant.