

國立屏東教育大學 101 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. Let $\vec{v} = (-3, 4)$. Find all unit vectors that are perpendicular to $\vec{v}$.
2. If a 3 by 3 matrix has $\det A = 2$, find $\det(2A)$ and $\det(A^{-1})$.
3. Find the eigenvalues and eigenvectors of matrix $\begin{bmatrix} 1 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 1 \end{bmatrix}$
4. Find the rank of $\begin{bmatrix} 1 & 2 & 1 \\ -1 & 1 & 2 \\ 1 & 0 & 1 \end{bmatrix}$
5. $A = \begin{bmatrix} 3 & 1 & 1 \\ 2 & 4 & 12 \\ -1 & -1 & 1 \end{bmatrix}$. Find a matrix P such that $P^{-1}AP = \Lambda$ is a diagonal matrix.
6. Determine whether or not vectors $\{(4, 7, 3), (-1, 2, 6), (2, -3, 5)\}$ in R^3 are linearly independent.
- 7.

$$A = \begin{bmatrix} 1 & 1 & 2 & 2 \\ 0 & -1 & 3 & 1 \\ 2 & -1 & 1 & 0 \\ -1 & 0 & x & 4 \end{bmatrix}. \text{ If } \text{rank}(A) = 3, \text{ find } x.$$

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

9. Given a 2×2 matrix $A = \begin{pmatrix} 4 & -5 \\ 2 & -3 \end{pmatrix}$, find A^n for any positive integer n .

10. If A and B are 2×2 invertible matrices and $A^t B^t = 5A^{-1}B^{-1}$, what is $|AB|$?