淡江大學 103 學年度碩士班招生考試試題

46-1

系別：資訊工程學系
資訊工程學系資訊網路與通訊碩士班

科目：線性代數

考試日期：3 月 2 日(星期日) 第 3 節

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1. (40%) Write **T** or **F** for each of the following statements to indicate whether the statement is true or false

   (a) ____The set $\{(1,1,1)^T,(1,1,0)^T,(1,0,0)^T\}$ is a spanning set for R^3.

   (b) ____The set $\{(1,1,1)^T,(1,1,0)^T,(1,0,0)^T\}$ is an orthogonal set in R^3.

   (c) ____The vectors of $\{(1,2,1)^T,(2,9,0)^T,(3,3,4)^T\}$ are liner independent and span R^3.

   (d) ____For any 3×3 square matrices A and B, $A\times B\neq B\times A$

   (e) ____The distance from the point $(2,0,0)$ to the plane $x+2y+2z=0$ is $\frac{2}{3}$

   (f) ____Let A be $n\times m$ matrix and λ be a scalar. "λ is an eigenvalues of A" and "$\det(A-\lambda I)=1$" are equivalent.

   (g) ____Let A be $n\times m$ matrix, if A is non-singular, then A doesn't have a multiplicative inverse.

   (h) ____Let A be a symmetric matrix, $A^TA=(A^TA)^T$.

   (i) ____Let A be $n\times n$ symmetric matrix, if A has rank n, then the reduced row echelon form of A^T is identity matrix $I_{n\times n}$.

   (j) ____Let $A=\begin{bmatrix}2&0&0\\0&4&0\\1&0&2\end{bmatrix}$ and $B=\begin{bmatrix}2&0&0\\-1&4&0\\-3&6&2\end{bmatrix}$. A and B both have the same eigenvalues.

2. (18%) Consider the matrices:

$$A=\begin{bmatrix}2&0\\-4&6\end{bmatrix}\quad B=\begin{bmatrix}1&-7&2\\5&3&0\end{bmatrix}\quad C=\begin{bmatrix}4&9\\-3&0\\2&1\end{bmatrix}\quad D=\begin{bmatrix}-2&1&8\\3&0&2\\4&-6&3\end{bmatrix}$$

$$E=\begin{bmatrix}0&3&0\\-5&1&1\\1&1&1\end{bmatrix}\quad F=\begin{bmatrix}1&0&0\\0&0&1\\0&1&0\end{bmatrix}\quad G=\begin{bmatrix}1&0&0\\0&1&0\\0&5&1\end{bmatrix}$$

   (a) (9%) Find the matrices X, Y, and Y^{-1} from matrices A~G such that

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