

科目：工程數學一(線性代數)

適用：電機系

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

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1. $A = \begin{bmatrix} 2 & 1 \\ -3 & 4 \\ 1 & 6 \end{bmatrix}$, $B = \begin{bmatrix} 0 & -1 & 0 \\ 4 & 0 & 2 \\ 8 & -1 & 7 \end{bmatrix}$

Find (a) AB (if they are defined).

(10 points)

(b) BA (if they are defined).

(10 points)

2. Find $(A^{-1})^T$ and $(A^T)^{-1}$ for

(20 points)

$$A = \begin{bmatrix} 1 & 0 \\ 9 & 3 \end{bmatrix} \text{ and also } A = \begin{bmatrix} 1 & c \\ c & 0 \end{bmatrix}.$$

3. For which values of k does

(20 points)

$$kx + y = 1$$

$$x + ky = 1$$

have no solution, one solution, or infinitely many solutions?

4. Find the rank and the nullspace of

(20 points)

$$B = \begin{bmatrix} 0 & 0 & 1 & 2 \\ 0 & 0 & 1 & 2 \\ 1 & 1 & 1 & 0 \end{bmatrix}$$

5. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Find (a) A^0

(10 point)

(b) A^n

(10 point)

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