

$$(a) \begin{bmatrix} -1 & 1 & 16 & 2 \\ 0 & 0 & 1 & 4 \\ 0 & 0 & 1 & 6 \\ 0 & 1 & 1 & -3 \end{bmatrix} \quad (b) \begin{bmatrix} -2 & 6 & 0 & 0 \\ 1 & 4 & 4 & 11 \\ 4 & -4 & -5 & 3 \\ -3 & 1 & 2 & -6 \end{bmatrix}$$

【分析】本題屬於題型03D.

【解】(細節略)

(a) 其逆矩陣為

$$\begin{bmatrix} -1 & 85/2 & -55/2 & 1 \\ 0 & -9/2 & 7/2 & 1 \\ 0 & 3 & -2 & 0 \\ 0 & -1/2 & 1/2 & 0 \end{bmatrix}$$

(b) 此矩陣經列運算可發現其rank為3, 不可逆.

(CH8定理17)

3. (10%) 【成大87資工】

Find the general solution of the system or show that the system has no solution.

$$8x_2 - 4x_3 + 10x_6 = 1$$

$$x_3 + x_5 - x_6 = 2$$

$$x_4 - 3x_5 + 2x_6 = 0$$

【分析】本題屬於題型03A.

【解】經列運算,

$$\left[\begin{array}{cccccc|c} 0 & 8 & -4 & 0 & 0 & 10 & 1 \\ 0 & 0 & 1 & 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 1 & -3 & 2 & 0 \end{array} \right] \sim \dots \sim \left[\begin{array}{cccccc|c} 0 & 1 & 0 & 0 & 1/2 & 3/4 & 9/8 \\ 0 & 0 & 1 & 0 & 1 & -1 & 2 \\ 0 & 0 & 0 & 1 & -3 & 2 & 0 \end{array} \right]$$

通解為 $x_1 = t_1, x_2 = 9/8 - (1/2)t_5 - (3/4)t_6, x_3 = 2 - t_5 + t_6, x_4 = 3t_5 - 2t_6,$

其中 t_1, t_5, t_6 為任意常數.

4. (10%) 【成大87資工】

Show that A is row equivalent to B and B is row equivalent to C . Prove that A is row equivalent to C .

【分析】本題屬於題型03E.

【解】 A 可經一串基本列運算化成 B , B 可經一串基本列運算化成 C , 所以 A 可經一串基本列運算化成 C .

5. (10%) 【成大87資工】

Determine the dimension of the subspace of \mathbb{R}^3 consisting of all vectors parallel to a given plane through the origin. (Here, \mathbb{R}^3 denotes a vector space with three components.)

【分析】本題屬於題型03E.

【解】2.