2.4 证明:

$\because$ Y为第1列为0的矩阵

设Y的形式为 $Y=\begin{pmatrix} y_{11} & \cdots & y_{n1} \\ y_{21} & & \vdots \\ \vdots & & \vdots \\ y_{m1} & \cdots & y_{mn} \end{pmatrix}=\begin{pmatrix} 0 & \cdots & y_{n1} \\ 0 & & \vdots \\ \vdots & & \vdots \\ 0 & \cdots & y_{mn} \end{pmatrix}$

$\therefore \det Y = 0\times A_{11}+0\times A_{21}+\cdots+0\times A_{m1}=0$

$\because$ I为单位矩阵, Z为全零矩阵

设A的形式为 $A=\begin{pmatrix} a_{11} & \cdots & a_{ij} \\ a_{21} & & \vdots \\ \vdots & & \vdots \\ a_{i1} & \cdots & a_{ij} \end{pmatrix}=\left(\begin{array}{c|ccc} 1 & 0 & \cdots & a_{ij} \\ \hline 0 & 1 & & a_{2j} \\ 0 & 0 & & \vdots \\ \vdots & \vdots & & \vdots \\ 0 & a & \cdots & a_{ij} \end{array}\right)$

可知A为分块三角矩阵, 设右下角矩阵为B

$\therefore \det A = 1\times \det B$

而 $\det B = 1\times A_{22}+0\times A_{32}+0\times A_{42}+\cdots+0\times A_{i2}$

$= 1\times \det Y + 0 = 0$

$\therefore \det A = 0$

$\therefore$ A为奇异矩阵