

$$|a| = a$$

$$\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc = a|d| - b|c| = ad - bc$$

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix} = a_1 \begin{vmatrix} a_5 & a_6 \\ a_8 & a_9 \end{vmatrix} - a_2 \begin{vmatrix} a_4 & a_6 \\ a_7 & a_9 \end{vmatrix} + a_3 \begin{vmatrix} a_4 & a_5 \\ a_7 & a_8 \end{vmatrix}$$

$$= a_1(a_5 a_9 - a_8 a_6) - a_2(a_4 a_9 - a_7 a_8) + a_3(a_4 a_8 - a_7 a_5)$$

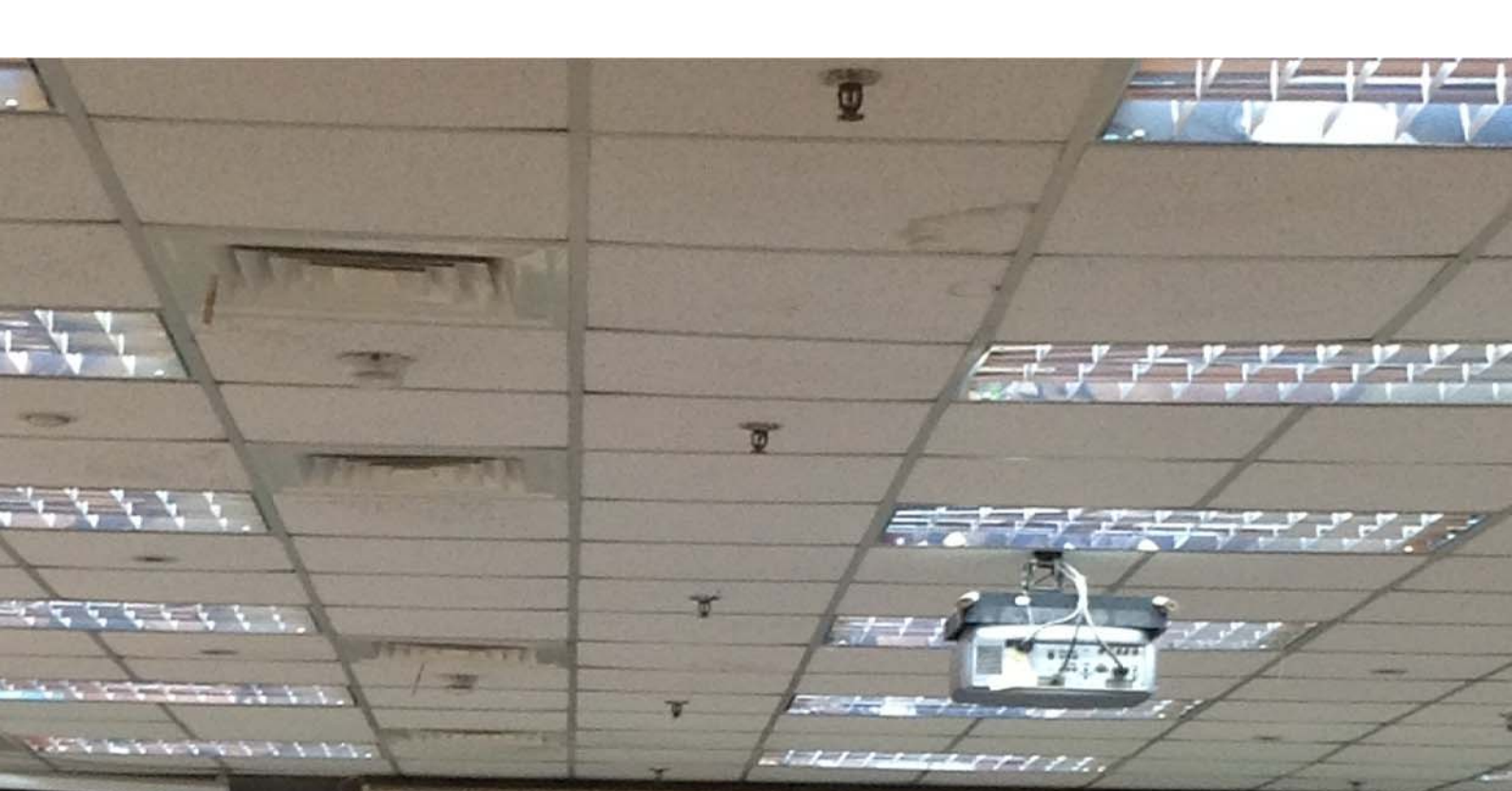
$$|A| = \sum_{j=1}^n (-1)^{i+j} a_{ij} a_{j1}$$

$$\begin{cases} E_{12} = -E_{21} = -E_{32} = -E_{31} \\ E_{13} = 1 \end{cases}$$

$$P = \begin{pmatrix} 1 & 2 & 3 \\ - & 3 & k \\ & & 1 \end{pmatrix}$$

$\begin{pmatrix} a_1 & a_2 & \dots & a_n \\ a_2 & a_3 & \dots & a_{n+1} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n-1} & a_n & \dots & a_{2n-1} \\ a_n & a_{n+1} & \dots & a_{2n} \end{pmatrix}$
 $A = \begin{pmatrix} a_1 & a_2 & \dots & a_n \\ a_2 & a_3 & \dots & a_{n+1} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n-1} & a_n & \dots & a_{2n-1} \\ a_n & a_{n+1} & \dots & a_{2n} \end{pmatrix}$





$\det(A) = |A|$
 $= a_{11}A_{11} + a_{12}A_{12} + \dots + a_{1n}A_{1n}$
 $= a_{11}A_{11} + a_{12}A_{12} + \dots + a_{1n}A_{1n}$

$A = \begin{pmatrix} a_{11} & a_{12} & \dots & a_{1n} \\ a_{21} & a_{22} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n1} & a_{n2} & \dots & a_{nn} \end{pmatrix}$
 $A_{ij} = (-1)^{i+j} \det(M_{ij})$

$|a| = a$
 $\begin{vmatrix} a & b \\ c & d \end{vmatrix} = ad - bc = a|d| - b|c| = ad - bc$
 $\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix} = a_{11} \begin{vmatrix} a_{22} & a_{23} \\ a_{32} & a_{33} \end{vmatrix} - a_{12} \begin{vmatrix} a_{21} & a_{23} \\ a_{31} & a_{33} \end{vmatrix} + a_{13} \begin{vmatrix} a_{21} & a_{22} \\ a_{31} & a_{32} \end{vmatrix}$
 $= a_{11}(a_{22}a_{33} - a_{23}a_{32}) - a_{12}(a_{21}a_{33} - a_{23}a_{31}) + a_{13}(a_{21}a_{32} - a_{22}a_{31})$

$|B| = -|A|$
 $B = \begin{pmatrix} a_{12} & a_{13} & \dots & a_{1n} \\ a_{22} & a_{23} & \dots & a_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ a_{n2} & a_{n3} & \dots & a_{nn} \end{pmatrix}$
 induction

