

2018/5/11 下午1:40 Office Lens

Friday, May 11, 2018 5:40 AM

可逆矩阵

Handwritten notes on a spiral notebook showing the steps to find the inverse of a 3x3 matrix using row reduction.

Initial matrix (augmented with identity):

$$\begin{bmatrix} 1 & -4 & -6 & | & 1 \\ -1 & -4 & 3 & | & 1 \\ -1 & 1 & -3 & | & 1 \end{bmatrix}$$

Row 2 + Row 1, Row 3 + Row 1:

$$\rightarrow \begin{bmatrix} 1 & -4 & -6 & | & 1 \\ 0 & -8 & -3 & | & 2 \\ 0 & -3 & -9 & | & 2 \end{bmatrix} \times -\frac{1}{8}$$

Row 2 $\times -\frac{1}{8}$:

$$\rightarrow \begin{bmatrix} 1 & -4 & -6 & | & 1 \\ 0 & 1 & \frac{3}{8} & | & -\frac{2}{8} \\ 0 & -3 & -9 & | & 2 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & -\frac{9}{2} & | & 0 \\ 0 & 1 & \frac{3}{8} & | & -\frac{2}{8} \\ 0 & 0 & -\frac{63}{8} & | & \frac{5}{4} \end{bmatrix}$$

Row 3 $\times -\frac{8}{63}$:

$$\rightarrow \begin{bmatrix} 1 & 0 & 0 & | & -\frac{5}{7} \\ 0 & 1 & 0 & | & -\frac{4}{21} \\ 0 & 0 & 1 & | & -\frac{5}{63} \end{bmatrix}$$

奇异矩阵

$$\begin{bmatrix} -8 & -7 & -3 & | & 1 \\ -9 & -9 & 0 & | & 1 \\ 7 & 7 & 0 & | & 1 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} -9 & -9 & 0 & | & 1 \\ -8 & -7 & -3 & | & 1 \\ 7 & 7 & 0 & | & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 1 & 0 & | & -\frac{1}{9} \\ -8 & -7 & -3 & | & 1 \\ 7 & 7 & 0 & | & 1 \end{bmatrix}$$

$$\rightarrow \begin{bmatrix} 1 & 1 & 0 & | & -\frac{1}{9} \\ 0 & 1 & -3 & | & \frac{1}{9} \\ 0 & 0 & 0 & | & \frac{16}{9} \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & 3 & | & -\frac{2}{9} \\ 0 & 1 & -3 & | & \frac{1}{9} \\ 0 & 0 & 0 & | & \frac{16}{9} \end{bmatrix}$$