

Why matrice ?

1. Force equilibrium
2. Flow equilibrium
3. Least square
4. Quadratic form
5. Grapph theory
6. Game theory
7. Geometric interpretation
8. Numerical method
9. Magic squares

$$\begin{bmatrix} 16 & 2 & 3 & 13 \\ 5 & 11 & 10 & 8 \\ 9 & 7 & 6 & 12 \\ 4 & 14 & 15 & 1 \end{bmatrix}$$

10. Linear transformation ($\mathbf{y} = \mathbf{Ax}$)

Matrice operation:

1. Addition ($\mathbf{C}=\mathbf{A}+\mathbf{B}$)
2. Multilpication ($\mathbf{E}=\mathbf{AB}$)
3. Decomposition ($\mathbf{F}=\mathbf{RU}=\mathbf{VR}$)
4. Transpose ($\mathbf{G} = \mathbf{C}^T$)
5. Eigenvalues and eigenvectors ($\mathbf{Ax} = \lambda\mathbf{x}$)
6. Similar matrices and diagonalization ($\mathbf{AC}=\mathbf{CD}$)
7. Inverse, determinant and Cramer's rule ($\mathbf{A}^{-1}, \det\mathbf{A}$)
8. Symmetric matrices and orthogonal diagonalization ($\mathbf{A}^T = \mathbf{A} = \Phi^T \mathbf{D} \Phi$)
9. Singularity, rank and nullity
10. $e^{\mathbf{A}}$, matrice differential equation and Cayley-Hamilton theorem ($\dot{\mathbf{x}} = \mathbf{Ax}$)