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Matrix 4×4 หา A^{-1}

$$A = \begin{bmatrix} 2 & 3 & 4 & 5 \\ 3 & 3 & 8 & 4 \\ 1 & 4 & 6 & 2 \\ 2 & 1 & 5 & 3 \end{bmatrix} \quad \therefore |A| = -27$$

$$C = \begin{bmatrix} 0 & -4 & 5 & -7 \\ -54 & -15 & 12 & 21 \\ 27 & 1 & -8 & -5 \\ 54 & 26 & -19 & -22 \end{bmatrix} \qquad \text{adj } A = C^T = \begin{bmatrix} 0 & -54 & 27 & 54 \\ -4 & -15 & 1 & 26 \\ 5 & 1 & -8 & -19 \\ -7 & 26 & -5 & -22 \end{bmatrix}$$

$$\therefore A^{-1} = \frac{\text{adj } A}{|A|} = \frac{1}{-27} \begin{bmatrix} 0 & -54 & 27 & 54 \\ -4 & -15 & 1 & 26 \\ 5 & 1 & -8 & -19 \\ -7 & 26 & -5 & -22 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 2 & -1 & -2 \\ 0.15 & 0.56 & -0.04 & -0.96 \\ -0.19 & -0.44 & 0.30 & 0.70 \\ 0.26 & -0.78 & 0.19 & 0.81 \end{bmatrix}$$

Input

$$\begin{pmatrix} 2 & 3 & 4 & 5 \\ 3 & 3 & 8 & 4 \\ 1 & 4 & 6 & 2 \\ 2 & 1 & 5 & 3 \end{pmatrix}^{-1} \quad \text{(matrix inverse)}$$

Result

Approximate form | Step-by-step solution

$$\frac{1}{27}\begin{pmatrix} 0 & 54 & -27 & -54 \\ 4 & 15 & -1 & -26 \\ -5 & -12 & 8 & 19 \\ 7 & -21 & 5 & 22 \end{pmatrix}$$

Expanded form

$$\begin{pmatrix} 0 & 2 & -1 & -2 \\ \frac{4}{27} & \frac{5}{9} & -\frac{1}{27} & -\frac{26}{27} \\ -\frac{5}{27} & -\frac{4}{9} & \frac{8}{27} & \frac{19}{27} \\ \frac{7}{27} & -\frac{7}{9} & \frac{5}{27} & \frac{22}{27} \end{pmatrix}$$

Dimensions

4 (rows) × 4 (columns)

Matrix plot

Trace

Approximate form | Step-by-step solution

$$\frac{5}{3}$$

Determinant

Enlarge | Data | Customize | Plain Text

$$-\frac{1}{27}$$

Characteristic polynomial

Approximate form | Step-by-step solution

$$\lambda^4 - \frac{5\lambda^3}{3} + \frac{14\lambda}{27} - \frac{1}{27}$$

Characteristic polynomial =

Eigenvalues

Exact forms | Step-by-step solution

$\lambda_1 \approx 1.42368$

$\lambda_2 \approx 0.689812$

$\lambda_3 \approx -0.519429$

$\lambda_4 \approx 0.0726052$

Eigenvectors

Exact forms | Step-by-step solution

$v_1 \approx (-6.5196, -2.3334, 2.615, 1)$

$v_2 \approx (7.17195, 1.71293, -3.52143, 1)$

$v_3 \approx (-1.47593, 1.07817, -0.610301, 1)$

$v_4 \approx (1.29726, 1.69541, 1.29664, 1)$

Diagonalization

$M = S.J.S^{-1}$

where

$$M \approx \begin{pmatrix} 0 & 2 & -1 & -2 \\ 0.148148 & 0.555556 & -0.037037 & -0.962963 \\ -0.185185 & -0.444444 & 0.296296 & 0.703704 \\ 0.259259 & -0.777778 & 0.185185 & 0.814815 \end{pmatrix}$$

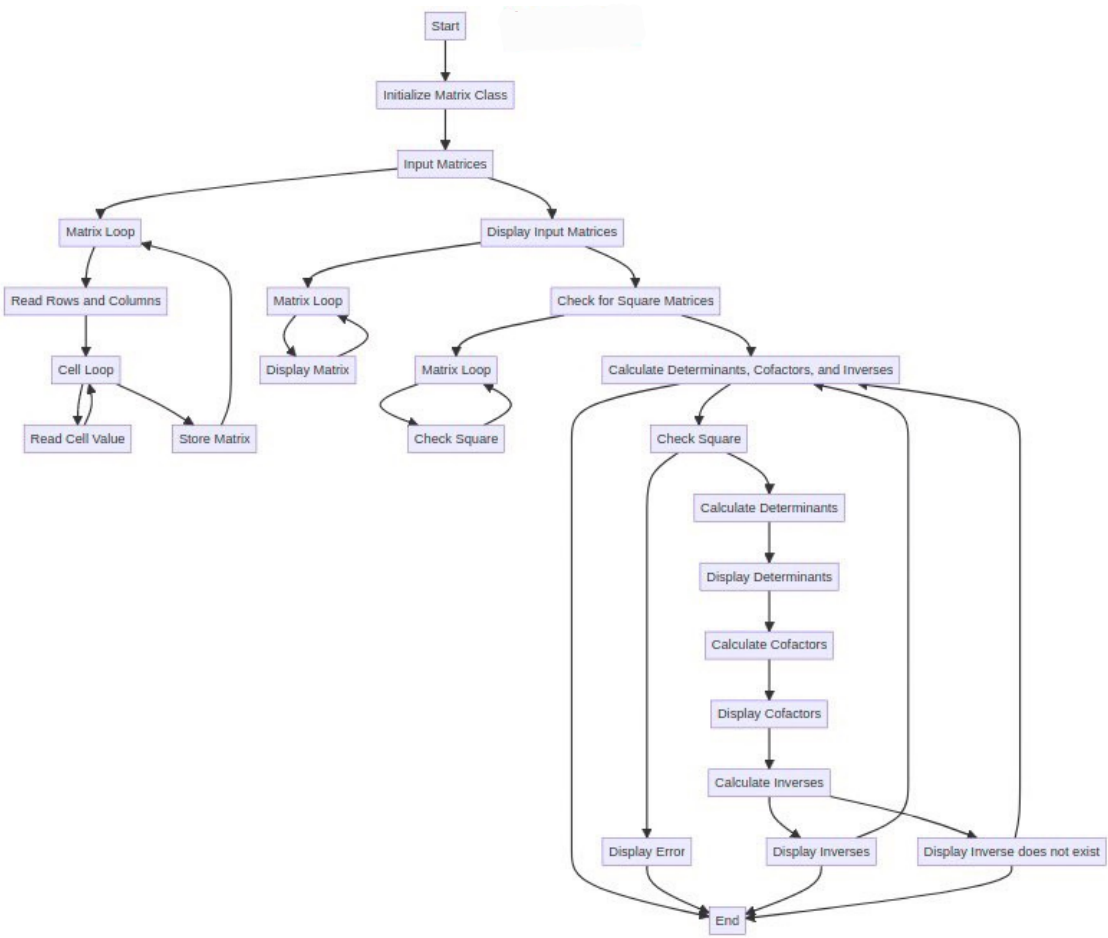
$$S \approx \begin{pmatrix} -1.47593 & 1.29726 & 7.17195 & -6.5196 \\ 1.07817 & 1.69541 & 1.71293 & -2.3334 \\ -0.610301 & 1.29664 & -3.52143 & 2.615 \\ 1 & 1 & 1 & 1 \end{pmatrix}$$

$$J \approx \begin{pmatrix} -0.519429 & 0 & 0 & 0 \\ 0 & 0.0726052 & 0 & 0 \\ 0 & 0 & 0.689812 & 0 \\ 0 & 0 & 0 & 1.42368 \end{pmatrix}$$

$$S^{-1} \approx \begin{pmatrix} -0.241828 & 0.373159 & -0.293505 & 0.0616249 \\ 0.0983406 & 0.16476 & 0.328058 & 0.167719 \\ 0.105977 & -0.231529 & -0.0791761 & 0.35772 \\ 0.0375106 & -0.306389 & 0.0446226 & 0.412936 \end{pmatrix}$$

Condition number

90


Start
Initialize Matrix Class
Input Matrices
Matrix Loop
Read Rows and Columns
Cell Loop
Read Cell Value
Store Matrix
Display Input Matrices
Matrix Loop
Display Matrix
Check for Square Matrices
Matrix Loop
Check Square
Calculate Determinants, Cofactors, and Inverses
Check Square
Calculate Determinants
Display Determinants
Calculate Cofactors
Display Cofactors
Calculate Inverses
Display Error
Display Inverses
Display Inverse does not exist
End