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Transforming a matrix to reduced row echelon form

v. 1.23b

TRANSFORMING MATRIX TO THE REDUCED ROW ECHELON FORM

Row
Operation
1:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 2 & 0 & 1 & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 2 & 2 & 2 & 2 & 0 & 0 & 0 & 1 \end{bmatrix}$$

add **-1** times the 1st row
to the 2nd row

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & -2 & -3 & -2 & -1 & 1 & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 2 & 2 & 2 & 2 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Row
Operation
2:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & -2 & -3 & -2 & -1 & 1 & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 2 & 2 & 2 & 2 & 0 & 0 & 0 & 1 \end{bmatrix}$$

add **-2** times the 1st
row to the 4th row

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & -2 & -3 & -2 & -1 & 1 & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 0 & -2 & -4 & -6 & -2 & 0 & 0 & 1 \end{bmatrix}$$

Row
Operation
3:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & -2 & -3 & -2 & -1 & 1 & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 0 & -2 & -4 & -6 & -2 & 0 & 0 & 1 \end{bmatrix}$$

multiply the 2nd row
by **-1/2**

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & 1 & \frac{3}{2} & 1 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 0 & -2 & -4 & -6 & -2 & 0 & 0 & 1 \end{bmatrix}$$

Row
Operation
4:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & 1 & \frac{3}{2} & 1 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 1 & 6 & -1 & 0 & 0 & 1 & 0 \\ 0 & -2 & -4 & -6 & -2 & 0 & 0 & 1 \end{bmatrix}$$

add **-1** times the 2nd
row to the 3rd row

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

Row
Operation
5:

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & 1 & \frac{3}{2} & 1 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 0 & \frac{9}{2} & -2 & \frac{-1}{2} & \frac{1}{2} & 1 & 0 \\ 0 & 0 & 2 & 2 & 2 & 0 & 0 & 1 \end{bmatrix}$$

add **2** times the 2nd
row to the 4th row

$$\begin{bmatrix} 1 & 2 & 3 & 4 & 1 & 0 & 0 & 0 \\ 0 & 1 & \frac{3}{2} & 1 & \frac{1}{2} & \frac{1}{2} & 0 & 0 \\ 0 & 0 & \frac{9}{2} & -2 & \frac{-1}{2} & \frac{1}{2} & 1 & 0 \\ 0 & 0 & 2 & 2 & 2 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{array}{cccc|ccc}
 & & & & 5 & 5 & 10 \\
 0 & 1 & 0 & 0 & \frac{1}{4} & -1 & \frac{-1}{4} & \frac{3}{8} \\
 0 & 0 & 1 & 0 & 0 & \frac{1}{5} & \frac{1}{5} & \frac{-1}{10} \\
 0 & 0 & 0 & 1 & \frac{1}{4} & \frac{1}{5} & \frac{-1}{20} & \frac{-9}{40}
 \end{array}$$

$$\begin{array}{cccc|ccc}
 & & & & 5 & 5 & 5 \\
 0 & 1 & 0 & 0 & \frac{1}{4} & -1 & \frac{-1}{4} & \frac{3}{8} \\
 0 & 0 & 1 & 0 & 0 & \frac{1}{5} & \frac{1}{5} & \frac{-1}{10} \\
 0 & 0 & 0 & 1 & \frac{1}{4} & \frac{1}{5} & \frac{-1}{20} & \frac{-9}{40}
 \end{array}$$

$$\begin{array}{cccc|ccc}
 1 & 2 & 0 & 0 & 0 & \frac{-7}{5} & \frac{-2}{5} & \frac{6}{5} \\
 0 & 1 & 0 & 0 & 0 & \frac{1}{4} & -1 & \frac{3}{8} \\
 0 & 0 & 1 & 0 & 0 & \frac{1}{5} & \frac{1}{5} & \frac{-1}{10} \\
 0 & 0 & 0 & 1 & 0 & \frac{1}{4} & \frac{1}{5} & \frac{-1}{20} & \frac{-9}{40}
 \end{array}$$

$$\begin{array}{cccc|ccc}
 1 & 0 & 0 & 0 & 0 & \frac{-1}{2} & \frac{3}{5} & \frac{1}{10} & \frac{9}{20} \\
 0 & 1 & 0 & 0 & 0 & \frac{1}{4} & -1 & \frac{-1}{4} & \frac{3}{8} \\
 0 & 0 & 1 & 0 & 0 & \frac{1}{5} & \frac{1}{5} & \frac{-1}{10} \\
 0 & 0 & 0 & 1 & 0 & \frac{1}{4} & \frac{1}{5} & \frac{-1}{20} & \frac{-9}{40}
 \end{array}$$

Row
Operation
14:

add **-2** times the 2nd
row to the 1st row