

1.

$$\begin{aligned}
 & \begin{vmatrix} 1 & 2 & -3 & 4 \\ 3 & -1 & 2 & 4 \\ -2 & -4 & -6 & -8 \\ 0 & 3 & -1 & 2 \end{vmatrix} = 2 \begin{vmatrix} 1 & 2 & -3 & 4 \\ 3 & -1 & 2 & 4 \\ -1 & -2 & -3 & -4 \\ 0 & 3 & -1 & 2 \end{vmatrix} \\
 & \xrightarrow{R_1 + R_3} 2 \begin{vmatrix} 0 & 0 & -6 & 0 \\ 3 & -1 & 2 & 4 \\ -1 & -2 & -3 & -4 \\ 0 & 3 & -1 & 2 \end{vmatrix} \\
 & = 2(-6) \begin{vmatrix} 3 & -1 & 4 \\ -1 & -2 & -4 \\ 0 & 3 & 2 \end{vmatrix} \\
 & \xrightarrow{R_1 + 3R_2} -12 \begin{vmatrix} 0 & -7 & -8 \\ -1 & -2 & -4 \\ 0 & 3 & 2 \end{vmatrix} \\
 & = -12(-1) \begin{vmatrix} -7 & -8 \\ 3 & 2 \end{vmatrix} \\
 & = 12 \quad (-14+24) \\
 & = 120
 \end{aligned}$$

$$\left( \begin{array}{cccc|cccc} 1 & 2 & -3 & 4 & 1 & 0 & 0 & 0 \\ 3 & -1 & 2 & 4 & 0 & 1 & 0 & 0 \\ -2 & -4 & -6 & -8 & 0 & 0 & 1 & 0 \\ 0 & 3 & -1 & 2 & 0 & 0 & 0 & 1 \end{array} \right)$$

$$\xrightarrow[\text{R}_3 + 2\text{R}_1]{\text{R}_2 - 3\text{R}_1} \left( \begin{array}{cccc|cccc} 1 & 2 & -3 & 4 & 1 & 0 & 0 & 0 \\ 0 & -7 & 11 & -8 & -3 & 1 & 0 & 0 \\ 0 & 0 & -12 & 0 & 2 & 0 & 1 & 0 \\ 0 & 3 & -1 & 2 & 0 & 0 & 0 & 1 \end{array} \right)$$

$$\text{R}_2 \div (-7) \left( \begin{array}{cccc|cccc} 1 & 2 & -3 & 4 & 1 & 0 & 0 & 0 \\ 0 & 1 & -1.57 & 1.14 & 0.43 & -0.14 & 0 & 0 \\ 0 & 0 & -12 & 0 & 2 & 0 & 1 & 0 \\ 0 & 3 & -1 & 2 & 0 & 0 & 0 & 1 \end{array} \right)$$

$$\xrightarrow[\text{R}_4 - 3\text{R}_2]{\text{R}_1 - 2\text{R}_2} \left( \begin{array}{cccc|cccc} 1 & 0 & 0.14 & 1.71 & 0.14 & 0.29 & 0 & 0 \\ 0 & 1 & -1.57 & 1.14 & 0.43 & -0.14 & 0 & 0 \\ 0 & 0 & -12 & 0 & 2 & 0 & 1 & 0 \\ 0 & 0 & 3.71 & -1.43 & -1.29 & 0.43 & 0 & 1 \end{array} \right)$$

$$\xrightarrow{\text{R}_3 \div (-12)} \left( \begin{array}{cccc|cccc} 1 & 0 & 0.14 & 1.71 & 0.14 & 0.29 & 0 & 0 \\ 0 & 1 & -1.57 & 1.14 & 0.43 & -0.14 & 0 & 0 \\ 0 & 0 & 1 & 0 & -0.17 & 0 & -0.08 & 0 \\ 0 & 0 & 3.71 & -1.43 & -1.29 & 0.43 & 0 & 1 \end{array} \right)$$

$$\xrightarrow[\text{R}_4 - (3.71)\text{R}_3]{\begin{array}{l} \text{R}_1 - (0.14)\text{R}_3 \\ \text{R}_2 + (1.57)\text{R}_3 \end{array}} \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1.71 & 0.17 & 0.29 & 0.01 & 0 \\ 0 & 1 & 0 & 1.14 & 0.17 & -0.14 & -0.13 & 0 \\ 0 & 0 & 1 & 0 & -0.17 & 0 & -0.08 & 0 \\ 0 & 0 & 0 & -1.43 & -0.67 & 0.43 & 0.31 & 1 \end{array} \right)$$

$$\xrightarrow{\text{R}_4 \div (-1.43)} \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 1.71 & 0.17 & 0.29 & 0.01 & 0 \\ 0 & 1 & 0 & 1.14 & 0.17 & -0.14 & -0.13 & 0 \\ 0 & 0 & 1 & 0 & -0.17 & 0 & -0.08 & 0 \\ 0 & 0 & 0 & 1 & 0.47 & -0.3 & -0.22 & -0.7 \end{array} \right)$$

$$\xrightarrow[\text{R}_2 - (1.14)\text{R}_4]{\text{R}_1 - (1.71)\text{R}_4} \left( \begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & -0.63 & 0.8 & 0.38 & 1.2 \\ 0 & 1 & 0 & 0 & -0.37 & 0.2 & 0.12 & 0.8 \\ 0 & 0 & 1 & 0 & -0.17 & 0 & -0.08 & 0 \\ 0 & 0 & 0 & 1 & 0.47 & -0.3 & -0.22 & -0.7 \end{array} \right)$$

The inverse matrix is  $\left( \begin{array}{cccc} -0.63 & 0.80 & 0.38 & 1.20 \\ -0.37 & 0.20 & 0.12 & 0.80 \\ -0.17 & 0.00 & -0.08 & 0.00 \\ 0.47 & -0.30 & -0.22 & -0.70 \end{array} \right)$