

Gaussian Elimination (Pivoting)

$$\begin{array}{l}
 R_1 \begin{bmatrix} \textcircled{2} & -4 & 18 \\ 3 & 3 & 9 \end{bmatrix} \quad R_1 \div 2 \quad R_2 - 3R_1 \\
 R_1' \begin{bmatrix} 1 & -2 & 9 \\ 0 & \textcircled{9} & -18 \end{bmatrix} \quad R_1 + 2R_2' \quad R_2 \div 9 \\
 R_1' \begin{bmatrix} 1 & 0 & 5 \\ 0 & 1 & -2 \end{bmatrix} \quad \begin{array}{l} \div 2 \\ \div 2 \end{array} \quad \begin{array}{l} \begin{pmatrix} 1 & -2 & 9 \\ 0 & 2 & -4 \end{pmatrix} \\ \begin{pmatrix} 1 & 0 & 5 \end{pmatrix} \end{array}
 \end{array}$$

$$\begin{array}{l}
 x = 5 \\
 y = -2
 \end{array}$$

Pivot around each entry on the main diagonal.

- (i) Make the pivot element into a 1 by dividing each element in the row by the pivot.
- (ii) Make the other entries in the pivot column be 0s, by adding or subtracting a multiple of the pivot row from each other rows.

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix} \quad \begin{array}{l} \# \\ \# \\ \# \\ \# \\ \# \\ \# \end{array}$$