

# Gauss-Jordan Elimination

**Gauss-Jordan elimination** (G-J) is defined by the following steps:

Step 1: Perform G-E, with row exchanges if necessary.

Step 2: Use row operations to create 0's *above* each pivot.

Step 3: Divide each row by its pivot.

Example:

$$\begin{aligned} [A|b] &= \left[ \begin{array}{ccc|c} 2 & 1 & 1 & 5 \\ 4 & -6 & 0 & -2 \\ -2 & 7 & 2 & 9 \end{array} \right] \xrightarrow{\text{G-E}} \left[ \begin{array}{ccc|c} 2 & 1 & 1 & 5 \\ 0 & -8 & -2 & -12 \\ 0 & 0 & 1 & 2 \end{array} \right] \\ &\rightarrow \left[ \begin{array}{ccc|c} 2 & 1 & 0 & 3 \\ 0 & -8 & 0 & -8 \\ 0 & 0 & 1 & 2 \end{array} \right] \rightarrow \left[ \begin{array}{ccc|c} 2 & 0 & 0 & 2 \\ 0 & -8 & 0 & -8 \\ 0 & 0 & 1 & 2 \end{array} \right] \\ &\rightarrow \left[ \begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{array} \right] \end{aligned}$$

We read off the solution immediately as  $u = 1, v = 1, w = 2$ .