> $A := Matrix([[1, 1, -2], [1, -2, 1], [2, -2, -1]]);$

$$A := \begin{bmatrix} 1 & 1 & -2 \\ 1 & -2 & 1 \\ 2 & -2 & -1 \end{bmatrix} \tag{1}$$

> $X := Vector([x, y, z]);$

$$X := \begin{bmatrix} x \\ y \\ z \end{bmatrix} \tag{2}$$

> #X:=Vector([1,-1,2]);

> $b := Vector([-4, 5, 2]);$

$$b := \begin{bmatrix} -4 \\ 5 \\ 2 \end{bmatrix} \tag{3}$$

> $A.X = b;$

$$\begin{bmatrix} x + y - 2z \\ x - 2y + z \\ 2x - 2y - z \end{bmatrix} = \begin{bmatrix} -4 \\ 5 \\ 2 \end{bmatrix} \tag{4}$$

> $with(LinearAlgebra):$

> $MatrixInverse(A);$

$$\begin{bmatrix} \frac{4}{3} & \frac{5}{3} & -1 \\ 1 & 1 & -1 \\ \frac{2}{3} & \frac{4}{3} & -1 \end{bmatrix} \tag{5}$$

> $P, L, U := LUDecomposition(\langle A|b \rangle);$

$$P, L, U := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}, \begin{bmatrix} 1 & 0 & 0 \\ 1 & 1 & 0 \\ 2 & \frac{4}{3} & 1 \end{bmatrix}, \begin{bmatrix} 1 & 1 & -2 & -4 \\ 0 & -3 & 3 & 9 \\ 0 & 0 & -1 & -2 \end{bmatrix} \tag{6}$$

> $L.U;$

$$\begin{bmatrix} 1 & 1 & -2 & -4 \\ 1 & -2 & 1 & 5 \\ 2 & -2 & -1 & 2 \end{bmatrix} \tag{7}$$

> $LUDecomposition(\langle A|b \rangle, output='R');$

$$\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{bmatrix} \tag{8}$$

>