Algorithm 3 Solve a square linear system $\mathbf{Ax} = \mathbf{b}$ using the LU factorization.

Require: The LU factors $\mathbf{L}$, $\mathbf{U}$, $\mathbf{P}$, $\mathbf{Q}$, and a vector $\mathbf{b}$.
procedure SolveLU($\mathbf{L}$, $\mathbf{U}$, $\mathbf{P}$, $\mathbf{Q}$, $\mathbf{b}$) ▷ Solve the linear system $\mathbf{Ax} = \mathbf{b}$
    $\mathbf{y} \leftarrow \mathbf{Pb}$ ▷ Apply the permutation matrix $\mathbf{P}$ to the vector $\mathbf{b}$
    $m,\ n \leftarrow \text{Size}(\mathbf{L})$ ▷ Get the size of $\mathbf{L}$
    for i **from** 2 **to** m **do** ▷ Solve $\mathbf{Ly} = \mathbf{Pb}$
        $y_i \leftarrow \text{Veil}\left(y_i - \sum_{j=1}^{i-1} L_{ij} y_j\right)$ ▷ Perform forward substitution
    end for
    $x_n \leftarrow \text{Veil}(y_n / U_{nn})$ ▷ Perform the first backward substitution
    for i **from** $n - 1$ **to** 1 **do** ▷ Solve $\mathbf{Ux} = \mathbf{y}$
        $x_i \leftarrow \text{Veil}\left(y_i - \sum_{j=i+1}^{n} U_{ij} x_j\right)$ ▷ Perform backward substitution
        $x_i \leftarrow \text{Veil}(x_i / U_{ii})$
    end for
    $\mathbf{x} \leftarrow \mathbf{Q}^\top \mathbf{x}$ ▷ Apply the permutation matrix $\mathbf{Q}^\top$ to the solution $\mathbf{x}$
end procedure