

$\mathbf{R} = \mathbf{0}$  {define a  $n \times n$  zero matrix}

$piv = 1 : n$

**for**  $k = 1$  to  $n$  **do**

$q = \{i : \mathbf{A}(i, i) = \max(\text{diag}(\mathbf{A}(k : n, k : n)))\} + k - 1$  {Finding the pivot}

**if** Stopping criterion **then**

stop {rank of  $\mathbf{A}$  is  $(k - 1)$ }

**end if**

$\mathbf{A}(:, k) \rightleftharpoons \mathbf{A}(:, q)$  {Swap columns}

$\mathbf{R}(:, k) \rightleftharpoons \mathbf{R}(:, q)$  {Swap columns}

$\mathbf{A}(k, :) \rightleftharpoons \mathbf{A}(q, :)$  {Swap rows}

$piv(k) \rightleftharpoons piv(q)$  {Swap pivoting position}

$\mathbf{R}(k, k) = \sqrt{\mathbf{A}(k, k)}$

$\mathbf{R}(k, k + 1 : n) = \mathbf{R}(k, k)^{-1} \mathbf{A}(k, k + 1 : n)$

$\mathbf{A}(k + 1 : n, k + 1 : n) = \mathbf{A}(k + 1 : n, k + 1 : n) - \mathbf{R}(k, k + 1 : n)^T \mathbf{R}(k, k + 1 : n)$

**end for**