

Math 300

Section 2.5 Matrix Factorizations

A matrix L is lower triangular if $l_{ij} = 0$ for all $i < j$. A matrix U is upper triangular if $u_{ij} = 0$ for all $i > j$.

If $A = LU$, then solving the matrix equation $A\mathbf{x} = \mathbf{b}$ is equivalent to solving the system

$$L\mathbf{y} = \mathbf{b}$$

$$U\mathbf{x} = \mathbf{y}.$$

To find L and U is to perform an LU factorization of A . The matrix U is found by row reducing A to row echelon form using only row replacements. The matrix L is found by beginning with the identity matrix, then placing at each position under the main diagonal the negative of the multiplier used to eliminate the corresponding entry from A .