§2.5 The LU Factorization

Let A be an $m \times n$ matrix that can be row reduced to echelon form. Then A can be written in the form $A = LU$, where L is an $m \times m$ lower triangular matrix with 1's on the diagonal and U is an $m \times n$ echelon form of A. Such a factorization is called an LU factorization of A. Furthermore, the matrix L is invertible and is called a unit lower triangular matrix.

An $m \times n$ upper triangular matrix is one whose entries below the main diagonal are 0's.

An $m \times n$ lower triangular matrix is one whose entries above the main diagonal are 0's.

Unit - 1's along the main diagonal

Algorithm for an LU Factorization

1. Reduce A to an echelon form U by a sequence of row replacement operations, if possible.
2. Place entries in L such that the same sequence of row operations reduces L to I.