Wedderburn Rank Reduction

LDU factorization

To find the factorization $A = LDU$ where

- L is lower triangular,
- U is upper triangular, and
- D is diagonal

we compute

- L a column c at a time,
- U a row r at a time, and
- D a diagonal entry d at a time

as follows:

(1) the next c is the first nonzero column of A,
(2) the next r is the first row with a nonzero entry in c, and
(3) the next d is the reciprocal of the first nonzero entry of r.
(4) the next matrix $A' = A - cdr$.

We repeat these four steps until the matrix is all zeros.

QDR factorization

To find the factorization $A = QDR$ where

- Q has orthogonal columns,
- R is upper triangular, and
- D is diagonal

and furthermore $Q^T Q = D^{-1}$, we compute

- Q a column c at a time,
- R a row r at a time, and
- D a diagonal entry d at a time

as follows:

(1) the next c is the first nonzero column of A,
(2) the next $r = c^T A$,
(3) the next d is the reciprocal of the first nonzero entry of r, and
(4) the next matrix $A' = A - cdr$.

We repeat these four steps until the matrix is all zeros.

The algorithms are identical except in step (2).