

# Class: Topological closure of Inverse M-Matrices (Singular inverse M-matrices, TCIM-matrices)

Status: All patterns that include all diagonal positions are done.

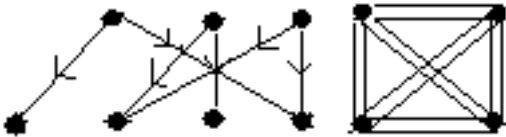
## Definitions

- The matrix  $A$  is TCIM-matrix if and only if it is in the topological closure of the class of inverse M-matrices, that is, if  $A$  is the limit of a sequence of inverse M-matrices [H6].
- The partial matrix  $B$  is a partial inverse M-matrix if and only if every fully specified principal submatrix of  $B$  is a TCIM-matrix and every specified entry of  $B$  is nonnegative.

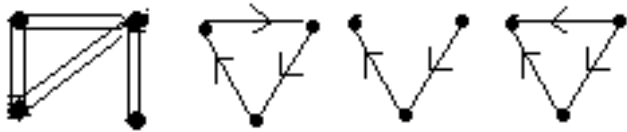
## Results:

- A pattern  $Q$  that includes all diagonal positions has TCIM-completion if and only if each component of its digraph  $G$  is a source/sink cut bipartite digraph or a clique. For such a pattern  $Q$ , the zero-completion of a partial TCIM-matrix specifying  $Q$  is a TCIM-matrix [H6].

## Examples: Have inverse M-completion



## Examples: Do not have inverse M-completion



## References:

- [H1] L. Hogben, Matrix Completion Problems for Pairs of Related Classes of Matrices. *Linear Algebra and Its Applications*, **373** (200), 13 – 29.