

Class: Symmetric M-Matrices

Note: Since this class is symmetric, all patterns are positionally symmetric and diagrams are graphs rather than digraphs.

Status: Done

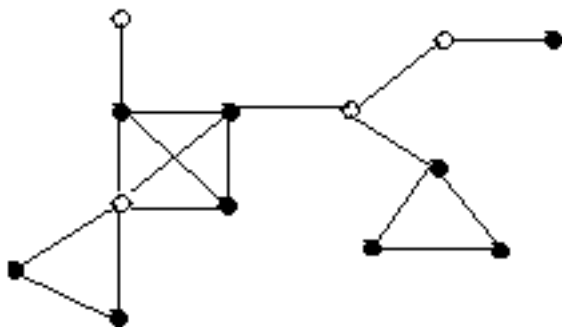
Definitions

- A matrix is a symmetric M-matrix if and only if it is symmetric and it is an M-matrix if and only if it is symmetric and every off-diagonal entry of A is nonpositive and every principal minor of A is positive (cf. M-matrix).
- The partial matrix B is a partial symmetric M-matrix if and only if every fully specified principal submatrix of B is a symmetric M-matrix, and whenever b_{ij} is specified then so is b_{ji} and $b_{ji} = b_{ij}$, and all specified off-diagonal entries are nonpositive.

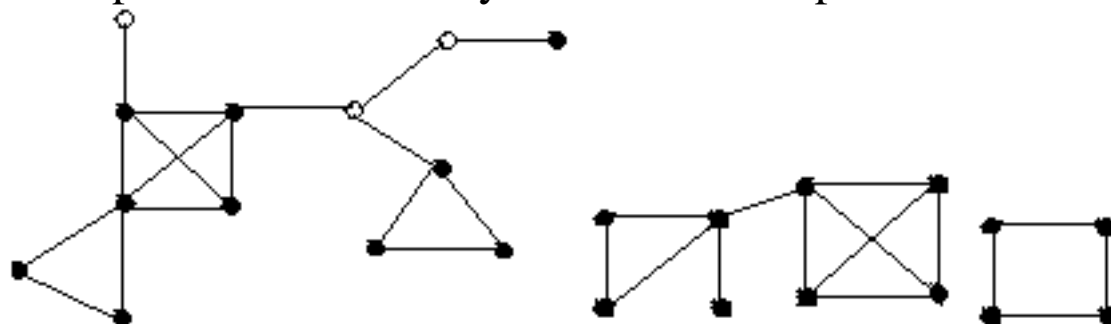
Results:

A pattern Q has symmetric M-completion if and only if the principal subpattern determined by the diagonal positions of Q has symmetric M-completion. A pattern that includes all diagonal positions has symmetric M-completion if and only if every component of its pattern-graph is a clique [H5].

Examples: Have symmetric M-completion



Examples: Do not have symmetric M-completion



References:

- [H5] L. Hogben, The symmetric M-matrix and symmetric inverse M-matrix completion problems, *Linear Algebra and Its Applications* **353** (2002) 159-168, draft available electronically in PDF format at <http://www.math.iastate.edu/lhogben/research/SymMatrixCompletion.pdf>.