

## Class: Symmetric $M_0$ -Matrices

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

Status: Done

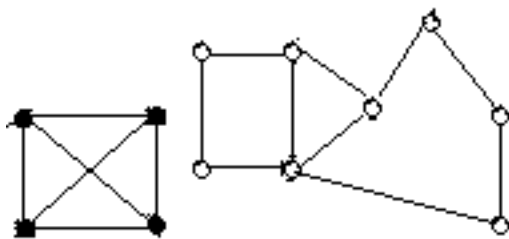
### Definitions

- A matrix is a symmetric  $M_0$ -matrix if and only if it is symmetric and it is an  $M_0$ -matrix if and only if it is symmetric and every off-diagonal entry of  $A$  is nonpositive and every principal minor of  $A$  is nonnegative (cf.  $M_0$ -matrix).
- The partial matrix  $B$  is a partial symmetric  $M_0$ -matrix if and only if every fully specified principal submatrix of  $B$  is a symmetric  $M_0$ -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.

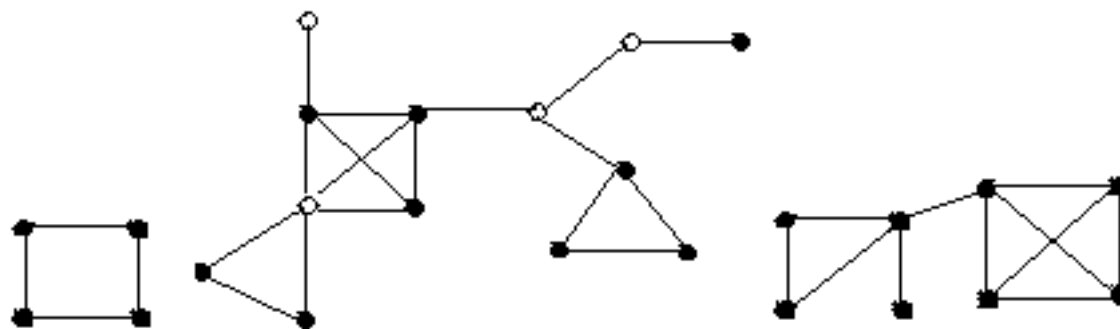
### Results:

A pattern has symmetric  $M_0$ -completion if and only if every principal subpattern corresponding to a component of its pattern-graph either omits all diagonal positions, or includes all positions (diagonal and off-diagonal). [H5].

### Examples: Have symmetric $M_0$ -completion



### Examples: Do not have symmetric $M_0$ -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>.

