

Class: Copositive Matrices

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

Status: Done

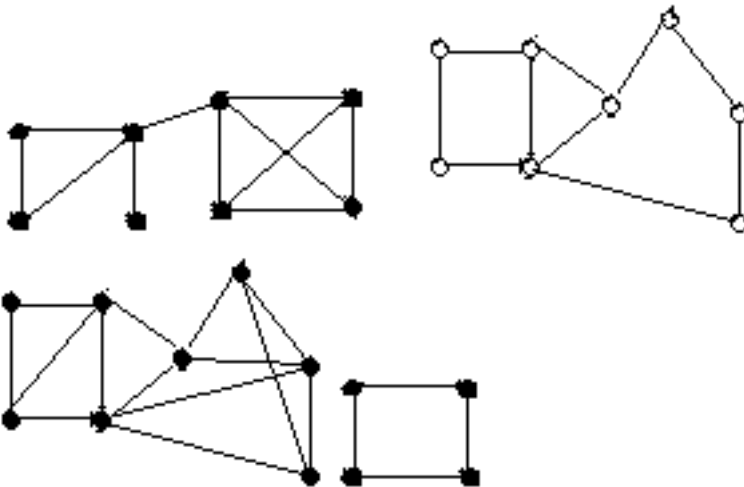
Definitions

- A matrix A is copositive if and only if A is symmetric and for all vectors x such that $x \geq 0$, $x^T A x > 0$.
- The partial matrix B is a partial copositive matrix if and only if every fully specified principal submatrix of B is a copositive matrix, and whenever b_{ij} is specified then so is b_{ji} and $b_{ji} = b_{ij}$.

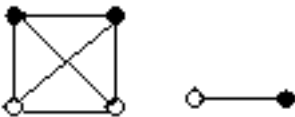
Results:

- Every pattern that includes all diagonal positions has copositive completion [HJR05].
- A pattern has copositive completion if and only if the principal subpattern corresponding to each component H of its pattern-graph either omits all diagonal positions or includes all diagonal positions.

Examples: Have copositive completion



Examples: Do not have copositive completion



References:

[HJR] The Copositive Completion Problem, with Charles R. Johnson and Robert Reams, *Linear Algebra and Its Applications*, **408** (2005) 207-211.

[H9] The Copositive Completion Problem: Unspecified Diagonal, preprint.