

Class: Positive Definite Matrices

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

Status: Done

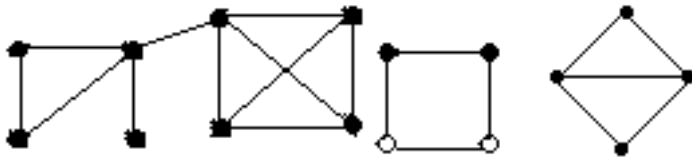
Definitions

- A matrix A is positive definite if and only if A is symmetric and for all $x \neq 0$, $x^T A x > 0$ if and only if A is symmetric and all principal minors are positive.
- The partial matrix B is a partial positive definite matrix if and only if every fully specified principal submatrix of B is a positive definite-matrix, and whenever b_{ij} is specified then so is b_{ji} and $b_{ji} = b_{ij}$.

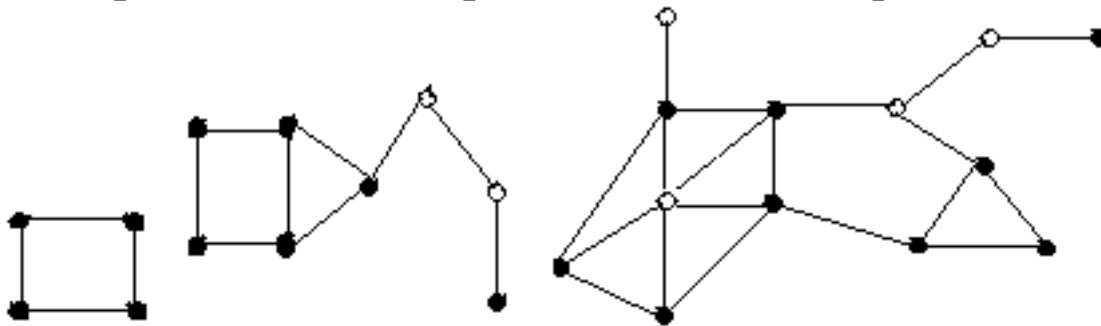
Results:

A pattern Q has positive definite-completion if and only if the principal subpattern determined by the diagonal positions of Q has positive definite-completion. A pattern that includes all diagonal positions has positive definite-completion if and only if its pattern-graph is chordal [GJSW].

Examples: Have positive definite-completion



Examples: Do not have positive definite-completion



References:

[GJSW] R. Grone, C. R. Johnson, E. M. Sá, and H. Wolkowicz, Positive Definite Completions of Partial Hermitian Matrices, *Linear Algebra and Its Applications* 58 (1984), 109-124.