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Irreducible 4 by 4 sign patterns that require 4 distinct eigenvalues

A sign pattern (matrix) is a matrix whose entries are from the set $\{+, -, 0\}$. Some necessary or sufficient conditions for a square sign pattern to require all distinct eigenvalues are presented. In particular, it is known that such sign patterns require a fixed number of real eigenvalues. The 3×3 irreducible sign patterns that require 3 distinct eigenvalues have been identified previously. The 4×4 irreducible sign patterns that require four distinct real eigenvalues and those that require four distinct nonreal eigenvalues are characterized. The 4×4 irreducible sign patterns that require two distinct real eigenvalues and two distinct nonreal eigenvalues are investigated.