

## Rank of adjacency matrices of directed (strongly) regular graphs

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## Rank of adjacency matrices of directed (strongly) regular graphs

Abstract: For a positive integer  $r$  we consider the set  $B_r$  of all values of  $\frac{k}{n}$  for which there exists an  $n \times n$  matrix with entries 0 and 1 such that each row and each column has exactly  $k$  1's and the matrix has rank  $r$ . We prove that the set  $B_r$  is finite, for every  $r$ .

If there exists a  $k$ -regular directed graph on  $n$  vertices such that its adjacency matrix has rank  $r$  then  $\frac{k}{n} \in B_r$ . We use this to exclude existence of directed strongly regular graphs for infinitely many feasible parameter sets.