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Richard M Wilson* (rmw@caltech.edu). *On the rank of matrices with few off-diagonal entries, and combinatorial applications.* Preliminary report.

Let M be a matrix of order n and of rank r . Let s be the number of distinct off-diagonal entries of M and assume that none of these values occur on the diagonal of M . Then

$$n \leq \binom{r+s}{s}.$$

For example, one immediate consequence is that the multiplicity of an eigenvalue $\lambda \neq 1, 0, -1$ of a $(0, 1)$ -matrix is less than $n - \sqrt{2n} + 2$.

Our talk will discuss applications and generalizations of this inequality. We recover known inequalities on systems of sets with restricted intersections and sets of points with restricted distances. In case the entries of M are integers, we give necessary conditions for equality and, under certain conditions, can reduce the bound for n to

$$n \leq \binom{r+t}{t}$$

with $t < s$. (Received September 22, 2015)