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*Alexandrov's inequality and some conjectures on Toeplitz matrices*

We prove the inequality $\det(QQ^*) \leq \det(RR^*)$ where $Q$ is a certain Toeplitz matrix associated with the Dirichlet kernel on the unit circle, and $R$ is any matrix of the same size as $Q$ whose entries have modulus $\geq 1$ on the support of the entries of $Q$, zero otherwise. This is a special case of a similar problem for all of the elementary symmetric functions; $S_k(QQ^*) \leq S_k(RR^*)$, in the case when $R$ is Toeplitz. The general case is still open. The proof uses Alexandrov's inequality on the polarized determinant (also known as the "mixed discriminant"). There are some connections with totally unimodular matrices, counting of bases modulo $p$, and Bazin–Reisz–Picquet determinant identities.