Hadamard's inequality

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Let $A = (a_{ij})$ with $1 \leq i, j \leq n \in \mathbb{N}$ be a square matrix with complex coefficients. Then the following inequality holds:

$$|\det(A)| \leq \prod_{i=1}^{n} \left(\sum_{j=1}^{n} |a_{ij}|^2 \right)^{\frac{1}{2}}.$$

Moreover, if A is Hermitian and positive semidefinite, the following inequality holds:

$$\det(A) \leq \prod_{i=1}^{n} a_{ii},$$

with equality if and only if A is a diagonal matrix.