A generalization of extremal functions and polynomial inequalities

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Consider a normed space $(\mathcal{P}(\mathbb{C}^N), \mathcal{N})$ of polynomials of N variables equipped with a fixed norm $\mathcal{N}$, which can be arbitrary. We can define a *radial* version of a polynomial extremal function, which has a sense in a general situation. In the case of the supremum norm, $\mathcal{N}(P) = \sup\{|P(z)| : z \in E\}$ our extremal functions are a radial modification of the classical Siciak's extremal function $\Phi(E, z)$. In this special case we can also consider a local radialization of the Siciak's extremal function and its logarithm $V(E, z)$ (the pluricomplex Green function). We shall show connections between the behaviour of such extremal functions and polynomial inequalities of Markov's and Bernstein's type. In particular, there will obtained new results on Bernstein' inequality involving higher derivatives of polynomials at interior points of compact subsets of $\mathbb{R}^N$.