LOG-CONCAVITY OF SOLUTIONS OF SEMI-LINEAR ELLIPTIC EQUATIONS IN CONVEX DOMAINS

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Abstract. In a bounded convex domain, a function which is positive in the interior of the domain and which vanishes on the boundary is called quasi-concave if all its upper level sets are convex. Positive solutions of many classes of semi-linear elliptic equations satisfying Dirichlet boundary conditions are known to be quasi-concave in convex domains, though counter-examples are also known. The principal eigenfunctions of the Dirichlet Laplacian in convex domains are known to be quasi-concave, and even log-concave, that is, their logarithm is concave. In this talk, I will review some of these classical results and report on recent results on log-concavity of solutions beyond the linear case, based on quantified versions of the anti-maximum principle.

The talk is based on joint works with Nikolai Nadirashvili.