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Sam Buss* (sbuss@math.ucsd.edu), Department of Mathematics, University of California, San Diego, La Jolla, CA 92130-0112. *Computational power of bounded arithmetic from the predicative viewpoint.*

We discuss theories of bounded arithmetic which are predicative in the sense of Nelson, that is, theories which are interpretable in Robinson's Q . We give a nearly exact characterization of functions which can be total in predicative bounded theories. As an upper bound, any such function has polynomial growth rate and its bit-graph is in nondeterministic exponential time and in co-nondeterministic exponential time. In fact, any function uniquely defined in a bounded theory of arithmetic lies in this class. Conversely, any function which is in this class (provably in $I\text{-}\Delta_0 + \text{exp}$) can be uniquely defined and total in a (predicative) bounded theory of arithmetic.

As a consequence, PSPACE operations such as approximate integration can be formalized directly into a Nelson-style predicative theory with no special treatment of "small" objects. (Received September 18, 2006)