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Computeralgebra, Krijgslaan 281 - Gebouw S22, Belgium, Ghent, B9000. *Phase transitions in logic
and combinatorics.*

We investigate parameterized assertions about the natural numbers which are true for all parameter values, which follow from the Peano axioms for small parameter values and which do not follow from the Peano axioms for large parameter values. In such a situation there is a sharp phase transition threshold from provability to unprovability. Somewhat surprisingly it turned out that in quite a few examples the computation of the threshold requires methods from other areas of mathematics like analytic combinatorics, Tauberian theory, and Ramsey theory. In our talk we will highlight some beautiful examples and we will spend some time on recent advances in the area. (Received September 25, 2006)