# The Oliver Club

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News About Newton's Method and a Question of Smale

Newton's method as a root finder is locally very fast, but the global dynamics seemed difficult to understand, even for complex polynomials in one variable. In particular, there may be open sets of starting points that converge to no roots (but to attracting cycles of higher periods). We describe how to turn Newton's method into an efficient root finder that, in the expected case, needs no more than

$$O\left(d^{2} \log^{5} d + d \log \left| \log \varepsilon \right| \right)$$

iterations to find all roots of a degree d polynomial with precision ε. We also answer a question by Smale to classify all polynomials for which there are attracting cycles of higher periods.
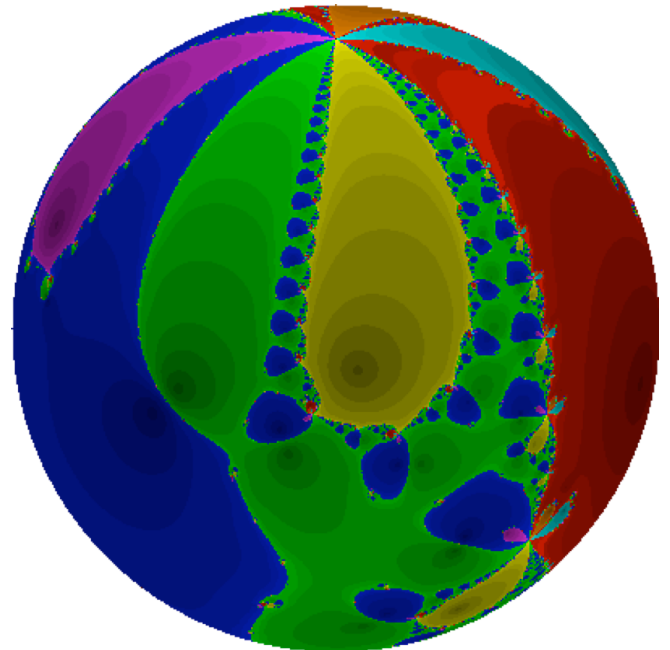
Thursday, March 29, 2012
at 4:00 PM in 532 Malott Hall

Refreshments will be served at 3:30 PM in the Mathematics Department lounge (532 Malott Hall).