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Basins of roots and periodicity in Newton's method for cubic polynomials.

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Newton's method is a useful tool for finding roots of functions when analytical methods fail. The goal of our research was to understand the dynamics of Newton's method on cubic polynomials with real coefficients. Usually iterations will converge quickly to the root. However, there are more interesting things that can happen. When we allow initial values to be chosen from the complex plane, we find that the points that converge are bounded by fractals. For some polynomials we found interesting phenomena including chaos and attracting periodic cycles. We classified which polynomials could have attracting periodic cycles. (Author's abstract)

Classification: N40 I90

Keywords: cubic polynomials; fixed points; Julia sets; attracting periodic cycles; bifurcation