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Nathaniel D Emerson* (nemerson@usc.edu), University of Southern California, 3620 South Vermont Ave., KAP 108, Los Angeles, CA 90089-2532. *On Yoccoz Return Functions.*

The key to understanding the dynamics of a complex polynomial is to understand the dynamics of its critical points. The Yoccoz τ -function codes the dynamics of a critical point with bounded orbit of some polynomials. We introduce a generalization of this function, the Yoccoz return function, which codes the dynamics of a critical point with bounded orbit of any complex polynomial with a disconnected Julia set. We give a complete description of Yoccoz return functions for an important class of polynomials. We derive necessary conditions on Yoccoz return functions, which allow for the recursive definition of an abstract tau-function. These conditions are also sufficient for polynomials that have a disconnected Julia set and exactly one critical point with bounded orbit. (Received September 13, 2009)