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James Eldred Pascoe* (pascoej@math.wustl.edu). *Invariant theory for non-commutative functions and applications.*

Given a group G which acts on d -dimensional space, it is natural to study the ring of polynomials which are invariant under the action of G , the so-called *ring of invariants*. Two key classical results in invariant theory are the fact that the ring of invariants is finitely generated, and the Chevalley-Shepard-Todd theorem which characterizes their structure. Similarly, one can study the noncommutative ring of invariant free polynomials and other non-commutative functions, which in turn have their own rich theory, starting in 1936, when Margarete C. Wolf showed that the ring of symmetric free polynomials in two or more variables is isomorphic to the ring of free polynomials in infinitely many variables, which corresponds to a free Chevalley-Shepard-Todd type theorem. We will discuss some recent advances in non-commutative invariant theory with some surprising applications to change of variables theory. (Received September 22, 2017)