1077-47-2006 **Christopher S Nelson*** (csnelson@math.ucsd.edu). *Noncommutative Real Ideals and an Algorithm for Computing Them.*

The zero set of a noncommutative polynomial p is the set of all pairs (X, v), where X is a tuple of square matrices and v is a vector, such that $p(X)v = 0$. If $p(X)v = 0$ whenever $q(X)v = 0$ for some other noncommutative polynomial q, then the zero set of q is contained in the zero set of p. A polynomial q has the left nullstellensatz property if whenever the zero set of a polynomial p contains the zero set of q, the polynomial p is equal to fq for some polynomial f. I give a framework for proving that certain polynomials have this left nullstellensatz property. Using this adds several natural cases to those previously known. Further, I introduce a noncommutative analog to the concept of a real ideal. The left ideal generated by a noncommutative polynomial q with the left nullstellensatz property must be a real ideal. I provide an algorithm for computing the smallest noncommutative real left ideal containing a noncommutative polynomial q. (Received September 21, 2011)