1060-16-45 **Murray R. Bremner*** (bremner@math.usask.ca), Mathematics and Statistics, University of Saskatchewan, Saskatoon, SK S7N 5E6, Canada. *How to compute the Wedderburn decomposition of an associative algebra.*

This will be an expository talk on algorithms that have been developed since the 1980's for explicit computation of the Wedderburn decomposition of a finite-dimensional associative algebra given a basis and structure constants. The first problem is to determine the radical; by a theorem of Dickson this can be reduced, in characteristic 0, to computing the nullspace of a matrix. Once a basis for the radical has been found, it is easy to determine the structure constants for the semisimple quotient. The center of the quotient is a commutative semisimple algebra, and hence is isomorphic to a direct product of fields; its dimension is the number of simple ideals in the quotient. The second problem is to split the center: to find a basis consisting of orthogonal primitive idempotents. These basis elements correspond to the identity matrices in the simple ideals. The third problem is to compute an explicit isomorphism of each simple ideal with a matrix algebra: that is, to determine a basis of matrix units. I will illustrate these computations with the 27-dimensional rational semigroup algebra of the full transformation semigroup on three letters: the semigroup of all functions from a set with three elements to itself under the operation of function composition. (Received March 08, 2010)