Operator algebras from free semigroup actions

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Abstract

In finite dimensions, Wedderburn's theory allows to completely identify matrix algebras as the direct sum of matrices. However this fails to be true when passing to infinite dimensions, that is, for *von Neumann algebras*. Initiated in the 30's by Murray and von Neumann, this class of operator algebras remains fascinating and an active area of research.

In the first talk we will set the context by giving the basics for von Neumann algebras. A key result will be the bicommutant theorem which essentially asserts that a von Neumann algebra M coincides with the algebra that leaves invariant the lattice of the invariant projections of M, i.e. it is *reflexive*.

In the 60's, Sarason realized that reflexivity can be formulated for non-selfadjoint operator algebras as well and gave the first basic results to this endeavour. In the second talk we will investigate this property for a class of non-selfadjoint algebras that recovers Sarason's result.

This will be very helpful for the last part where we will investigate non-selfadjoint algebras related to dynamical systems, that is, *semicrossed products*. Initiated by Arveson in the 60's, they have been proven quite useful for encoding dynamics in a rather rigid way.

In the third talk we will show that the semicrossed product that arises from the free semigroup action on a factor von Neumann algebra is always reflexive (Helmer 2015, Bickerton-Kakariadis 2017).