

Department of Mathematics, BGU

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# Logic, Set Theory and Topology

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*On Tuesday, November 24 2015*

*At 12:15 – 13:40*

*In Math 101-*

Mati Rubín (Ben-Gurion University of the Negev)

will talk about

## **On the reconstruction of the action of a clone from its algebraic structure**

Abstract: Yonah Maissel and Matatyahu Rubín Ben Gurion University, Beer Sheva, Israel Ralph McKenzie proved that if  $G$  is a group of permutations of a set  $A$  with cardinality different from 6 and  $\neq 1$  then the action of  $G$  on  $A$  can be recovered from the group  $G$  using first order formulas. The analogous problems for semigroups of functions from a set  $A$  to itself and for clones on  $A$  have not been considered (so it seems). I shall present four analogues of McKenzie's theorem. Here is one of them. Theorem :1 Let  $A$  be a set whose cardinality is different from 6 and  $\neq 1$  and let  $S$  be a semigroup of functions from  $A$  to  $A$  containing all transpositions of  $A$ . Then the action of  $S$  on  $A$  can be recovered from the algebraic structure of the semigroup  $S$  using first order formulas. A function  $f$  from  $A$  to  $A$  is called a semi-transposition, if there are distinct  $a, b \in A$  such that  $f(a) = b$ , and for every  $c \in A$ : if  $c \neq a$ , then  $f(c) = c$ . Theorem :2 Let  $A$  be a set whose cardinality different

from [1] and let  $S$  be a semigroup of functions from  $A$  to  $A$  containing all semi-transpositions of  $A$ . Then the action of  $S$  on  $A$  can be recovered from the algebraic structure of the semigroup  $S$  using first order formulas. Theorem 3 The analogues of Theorems 1 and 2 for clones are also true. I shall present several open questions both for semigroups of functions and for clones.