

Some Remarks about Semigroups of Contraction Mappings of a Finite Chain

Abdullahi Umar

Department of Mathematics, The Petroleum Institute, Abu Dhabi, U. A. E.

`aumar@pi.ac.ae`

The study of various (sub)-semigroups of transformations/mappings has made a significant contribution to semigroup theory. The most notable classes are the three fundamental semigroups of transformations: the *full symmetric semigroup*, the *partial symmetric semigroup* and the *symmetric inverse semigroup*. The subsemigroups of *order-preserving* transformations, *order-decreasing (extensive)* transformations and their intersections were arguably the most studied. Others are the *Baer-Levi* and *Croissot-Teissier* semigroup.

It is now established how counting certain natural equivalence classes in various semigroups of partial transformations of an n -set leads to very interesting enumeration problems. Many numbers and triangle of numbers regarded as combinatorial gems like the Fibonacci number, Catalan number, Schröder number, Stirling numbers, Eulerian numbers, Narayana numbers, Lah numbers, etc. have all featured in these enumeration problems. These enumeration problems lead to many numbers and triangle of numbers in the Online encyclopaedia of integer sequences (OEIS), but there are also others that are not yet or have just been recently recorded in OEIS.

In this talk, we are going to focus on the combinatorial (enumerative) aspects of the classes of *contraction* transformation semigroups, which for some curious reason(s) until very recently little is known about.