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Mahir Bilen Can* (mcan@tulane.edu), Mathematics Department, Tulane University, 6823 St. Charles Ave., New Orleans, LA 70118. *Some enumerative and order theoretic aspects of the rook monoid.*

In this talk we will be looking into enumerative and order theoretic properties of the rook monoid which is the inverse semigroup of $n \times n$ 0/1 matrices with at most one 1 in each row and each column. We show that the rank function on matrices restricted to some subsemigroups of the rook monoid leads to the generating functions of important combinatorial sequences such as Eulerian numbers, Catalan numbers, Narayana numbers, etc.. We look into the extensions of the weak and the strong Bruhat orderings to the rook monoid. Furthermore, we investigate the embeddings of a symmetric group into a rook monoid as a Bruhat subposet (joint work with L. Renner). If time permits using the monoid Hecke algebra and its Kazhdan-Lusztig polynomials we investigate the embeddings of the intervals of a rook monoid into a symmetric group (joint work with K. Aker). (Received September 21, 2009)