The Relative Rank of Various Transformation Semigroups With Restricted Range

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Abstract : The relative rank of a semigroup S modulo a subset A is the minimum cardinality of a set B such that $\langle A \cup B \rangle = S$. The concept of the relative rank and its characterization were first studied by J. M. Howie, N. Ruškuc, and P. M. Higgins in 1998. Further research about the relative rank was continue studied by N. Ruškuc, P. M. Higgins, J. D. Mitchell, etc. Let X be a finite chain and let Y be a subchain of X. The semigroup $T(X,Y)$, the set of all full transformations from X into Y, was first introduced by J. S. V. Symons in 1975. In this talk, we determine the relative rank of various transformation semigroups with restricted range modulo given sets. In particular, all minimal generating sets of $T(X,Y)$ modulo $OP(X,Y)$, the set of all orientation-preserving transformations, are also characterized.

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