RING MORPHISMS ON STRONGLY MAGIC SQUARES

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ABSTRACT

Several aspects of magic(al) square studies fall within the computational universe. Experimental computation has revealed patterns, some of which have lead to analytic insights, theorems or combinatorial results. Other numerical experiments have provided statistical results for some very difficult problems. Magic squares generally fall into the realm of recreational mathematics [4, 5], however a few times in the past century and more recently, they have become the interest of more-serious mathematicians. The unique normal square of order three was known to the ancient Chinese, who called it the Lo Shu. A version of the order-4 magic square with the numbers 15 and 14 in adjacent middle columns in the bottom row is called Dürer's magic square. A magic square is a square array of numbers where the rows, columns, diagonals and co-diagonals add up to the same number, known as the magic constant. The paper discuss about a well-known class of magic squares; the strongly magic square. The strongly magic square is a magic square with a stronger property that the sum of the entries of the sub-squares taken without any gaps between the rows or columns is also the magic constant. In this paper a generic definition for Strongly Magic Squares is given. A function on strongly magic squares is also defined and it is proved to be a group homomorphism and isomorphism. The paper also sheds light on the ring isomorphism of strongly magic squares

Keywords: Magic Square, Magic Constant, Strongly Magic Square, Homomorphism, Isomorphism, Ring morphism.