Nasir Ganikhodjaev
Farrukh Mukhamedov
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VOLUME 1

$$x' = 2xy$$
$$y' = 2xz$$

INVESTIGATIONS ON PURE MATHEMATICS, FINANCE MATHEMATICS AND OPTICS

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$$\varphi_1(x, y, z) = z$$

$$z' = x^2 + y^2 + z^2 + 2yz$$

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ON AS SOCIATIVE ALGEBRAIC STRUCTURE OF GENETIC INHERITANCE

Haziana @ Hartini Hisamuddin
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Abstract. *General genetic algebra is actually the product of interaction between biology and mathematics. In history, Mendel exploited some symbolism to express his genetic laws. The sign "x" that indicates sexual reproduction was introduced by Serebrowsky He also was the first to give mathematical formulation of the Mendelian laws. There are many scholars that worked in this general genetic algebra such as Etherington, Gonshor, Schafer, Holgate, Hench, Reiser, Abraham, Lyubich, Reed and Worz-Busekos. In this paper we will explore the associative algebraic structure that naturally occurs as genetic information gets passed down through the generations. While there are many previous published papers that were discussing the non-associative algebra, but in this paper we will discuss that there is a case when the algebra is associative. We will apply the theory of quadratic stochastic operator and we will define a family of quadratic stochastic operator such that the corresponding algebraic structures are associative. This paper considers for the case of* $n = 2$, *i.e. for l-dimensional simplex in* R^2 *with the basis is* $\{A, a\}$, *and by using this basis, we will construct the multiplication table. This paper views from mathematical perspective and the means for the associativity in biological is left for further research. The significance of this study is that it could be used for further research in biology.*

1 Introduction

In this final year project, we will consider the algebraic structure that occurs as genetic information is passed down through the generations. We will apply the theory of Quadratic Stochastic Operators to the naturally study of such algebraic structures. Generally, these algebraic structures are non- associative. Nevertheless, we will define a family of Quadratic Stochastic Operators such that the corresponding algebraic structures are associative.

1.1 History of general genetic algebras

In history, Mendel (1959) in his first paper exploited some symbolism to express his genetic laws. These symbolisms are quite algebraically evocative. In fact, it was later termed "Mendelian algebras" by several authors. In the 1920s and 1930s, general genetic algebras were introduced. Serebrowsky (1934) was the first to give an algebraic interpretation of the multiplication sign "x", and to give a mathematical formulation of the Mendelian laws. The multiplication sign "x" actually indicates sexual reproduction. Glivenkov (1936) continued to work in the similar direction and introduced the Mendelian algebras for diploid populations with one locus or two unlinked loci. Independently, Kostitzin in 1938 also introduced a "symbolic multiplication" to express the Mendelian laws.

The systematic study of algebras occurring in genetics was due to I. M. H. Etherington. In his paper, Non-associative algebra and the symbolism of genetics, he