

## CHAPTER 1

# **An Overview to Mathematics**

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### **1.1 INTRODUCTION**

Mathematics is one of the most important subjects as it appears in many real life applications. For instance, basic counting or calculations, spending money and determining the time for daily activities are all taught in mathematics courses at the earliest level of education around the world. In the current challenging and modernized world, mathematics is expanded to study and provide solutions to many complex problems of sciences, engineering and industries. Furthermore, it can be seen that many recent technologies have been developed based on scientific studies that involve mathematics and in fact, modern technology would be unthinkable without mathematics. This edited book presents a few studies on mathematics that are based on some real applications.

In this introductory chapter, a brief overview of mathematics will be presented and this begins with its definitions from a few scholars. After that, the branches of mathematics are reviewed to show the diversity of mathematics according to the related problems. Furthermore, some world's greatest mathematicians are also briefly mentioned as an appreciation for their contributions to the subject. In addition, since this edited book highlights the use of mathematics in a real problem, Section 1.5 will describe a mathematical approach to understand and solve a problem. Finally, a summary of each proceeding chapter will be given in Section 1.6 before this chapter is concluded.

## 1.2 DEFINITION OF MATHEMATICS

There are many definitions of mathematics from books and articles, but no such one definition is universally accepted by all. The following are three selected definitions of mathematics in this chapter.

### **By Reuben Hersh (1979)** (Hersh, 1979)

Mathematics is ideas that can be represented by physical objects, not pencil marks or chalk marks, also not physical triangles or physical sets. It is human who invented or created mathematical objects, either from the existing mathematical objects or due to the demands of daily life and science. Once created, the properties of mathematical objects are well determined, although they are sometimes difficult to be discovered, but still could be useful in describing aspects of nature.

### **By Mogen Niss (1994)** (Niss, 1994)

Mathematics is a field of several different respects. It is a science in an epistemological sense, oriented towards developing, describing and understanding objects, relationships, mechanisms or phenomena, belonging on some domain. When this domain consists of what we usually think of as mathematical entities, mathematics is actually a pure science. In this capacity, mathematics aims at internal self-development and self-understanding, independently of the world outside, except for the fact that mathematics is exercised by human beings, interacting with each other and working in societal institutions in accordance with social norms and habits. If, on the other hand, the domain under consideration lies outside of mathematics, typically within some other scientific fields, mathematics acts as an applied science. Here, many aspects of

extra-mathematical areas are understood and developed. Needless to say, mathematics as a pure science has important contributions to mathematics as an applied science, although often with a great delay. The main difference between these two aspects of mathematics is the focus of attention rather than mathematical content. Whether pure or applied, mathematics as a science serves to generate knowledge and insight.

**By Cosette Crisan (2021)** (Crisan, 2021)

Mathematics is a powerful tool for making sense of the world; an art with its aesthetic appeal; a language with its own syntax and syntactic rules that facilitate precise, concise and rigorous communication; a poetry that I read and ‘do’ for pure personal enjoyment; and a creative art, with its struggles, frustrations and elations.

### **1.3 BRANCHES OF MATHEMATICS**

Several different classifications or branches of mathematics arise due to different purposes on how mathematics serves. Mathematics normally involves the study of numbers and other fields or branches of mathematics are developed based on the applications of the numbers. The development eventually arises to make considerable contributions to technologies. The following are some of the branches of mathematics that are taught during primary education of mathematics. The descriptions of each branch are generally referred from Stat Analytica (2020).