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# CHAPTER 1

The first part of the book is devoted to the study of the properties of the real numbers. We begin with the natural numbers, which are the counting numbers. The natural numbers are closed under addition and multiplication, and they have a multiplicative identity (1) and an additive identity (0). The natural numbers are also ordered, and they have a least element (1). The natural numbers are not closed under subtraction and division, so we need to extend them to the integers and then to the rational numbers.

The integers are the natural numbers together with their additive inverses. The integers are closed under addition, subtraction, and multiplication, and they have a multiplicative identity (1) and an additive identity (0). The integers are also ordered, and they have a least element (1). The integers are not closed under division, so we need to extend them to the rational numbers.

The rational numbers are the integers together with their multiplicative inverses. The rational numbers are closed under addition, subtraction, multiplication, and division, and they have a multiplicative identity (1) and an additive identity (0). The rational numbers are also ordered, and they have a least element (1). The rational numbers are not closed under the operation of taking square roots, so we need to extend them to the real numbers.

The real numbers are the rational numbers together with their square roots. The real numbers are closed under addition, subtraction, multiplication, and division, and they have a multiplicative identity (1) and an additive identity (0). The real numbers are also ordered, and they have a least element (1). The real numbers are not closed under the operation of taking square roots of negative numbers, so we need to extend them to the complex numbers.

CHAPTER 2