

*Notes on*

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**A CONCISE INTRODUCTION TO PURE  
MATHEMATICS**

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# 1 Sets and Proofs

## 1.1 Sets

A *set* is a collection of objects called *elements* or *members*. In simple cases, we can enumerate all members with this notation:  $\{1, 3, 5\}$ . Often we cannot list all of the elements. For example, "the set of all real numbers whose square is less than 2" can be expressed as

$$\{x | x \text{ a real number, } x^2 < 2\}$$

where  $|$  is read as "such that."

The *empty set*,  $\emptyset$ , is a set with no objects.

If  $s$  is in set  $S$ , we say " $s$  belongs to  $S$ " and denote it as  $s \in S$ . Conversely, if  $s$  is not in  $S$ , it is denoted as  $s \notin S$ .

Two sets are *equal* when they contain exactly the same elements.  $T$  is a subset of  $S$  if all elements of  $T$  also belong to  $S$ ; this relationship is denoted as  $T \subseteq S$ , or  $T \not\subseteq S$  if  $T$  is not a subset of  $S$ . The empty set is a subset of all sets.

## 1.2 Proofs

## References