

## Key Terms and Results

### TERMS

**set集合**: a collection of distinct objects

**axiom公理**: a basic assumption of a theory

**paradox悖论**: a logical inconsistency

**element, member of a set集合元素**: an object in a set

**roster method列举法**: a method that describes a set by listing its elements

**set builder notation集合构造器标记法**: the notation that describes a set by stating a property an element must have to be a member

$\emptyset$  (**empty set, null set**) **空集**: the set with no members

**universal set全集**: the set containing all objects under consideration

**Venn diagram文氏图**: a graphical representation of a set or sets

**$S = T$  (set equality)集合相等**: S and T have the same elements

**$S \subseteq T$  (S is a subset of T)子集**: every element of S is also an element of T

**$S \subset T$  (S is a proper subset of T)真子集**: S is a subset of T and  $S \neq T$

**finite set有限集**: a set with n elements, where n is a nonnegative integer

**infinite set无限集**: a set that is not finite

**$|S|$  (the cardinality of S)基数**: the number of elements in S

**$P(S)$  (the power set of S)幂集**: the set of all subsets of S

**$A \cup B$  (the union of A and B)并**: the set containing those elements that are in at least one of A and B

**$A \cap B$  (the intersection of A and B)交**: the set containing those elements that are in both A and B.

**$A - B$  (the difference of A and B)差**: the set containing those elements that are in A but not in B

**$A \oplus B$  (the symmetric difference of A and B)对称差**: the set containing those elements in exactly one of A and B

**$\overline{A}$  (the complement of A)补**: the set of elements in the universal set that are not in A

aining those elements in exactly one of A and B

**membership table成员表**: a table displaying the membership of elements in sets

**function from A to B 函数**: an assignment of exactly one element of B to each element of A

**domain of f 定义域**: the set A, where f is a function from A to B

**codomain of f 伴域**: the set B, where f is a function from A to B

**b is the image of a under f 像**:  $b = f(a)$

**a is a preimage of b under f 前像**:  $f(a) = b$

**range of f 值域**: the set of images of f

**onto function, surjection满射**: a function from A to B such that every element of B is the image of some element in A

**one-to-one function一对一函数, injection入射**: a function such that the images of elements in its domain are

distinct

**one-to-one correspondence**一一对应, **bijection**双射: a function that is both one-to-one and onto

**inverse of f**逆: the function that reverses the correspondence given by f (when f is a bijection)

**$f \circ g$  (composition of f and g)**合成: the function that assigns  $f(g(x))$  to  $x$

**floor function of x**向下取整函数: the largest integer not exceeding  $x$

**ceiling function of x**向上取整函数: the smallest integer greater than or equal to  $x$

**partial function**部分函数: an assignment to each element in a subset of the domain a unique element in the codomain

**sequence**序列: a function with domain that is a subset of the set of

**geometric progression**几何级数: a sequence of the form  $a, ar, ar^2, \dots$ , where  $a$  and  $r$  are real numbers

**arithmetic progression**算术级数: a sequence of the form  $a, a+d, a+2d, \dots$ , where  $a$  and  $d$  are real numbers

**string**串: a finite sequence

**empty string**空串: a string of length zero

**recurrence relation**递推关系: a equation that expresses the  $n$ th term an of a sequence in terms of one or more of the previous terms of the sequence for all integers  $n$  greater than a particular integer

**cardinality**基数: two sets  $A$  and  $B$  have the same cardinality if there is a one-to-one correspondence from  $A$  to  $B$

**countable set**可数集: a set that either is finite or can be placed in one-to-one correspondence with the set of positive integers

**uncountable set**不可数集: a set that is not countable

**$\aleph_0$  (aleph null)**: the cardinality of a countable set

**$c$** : the cardinality of the set of real numbers

**Cantor diagonalization argument**康托对角线论证法: a proof technique used to show that the set of real numbers is uncountable

**computable function**可计算函数: a function for which there is a computer program in some programming language that finds its values

**uncomputable function**不可计算函数: a function for which no computer program in a programming language exists that finds its values

**continuum hypothesis**连续统假设: the statement there no set  $A$  exists such that  $\aleph_0 < |A| < c$

**matrix**矩阵: a rectangular array of numbers

**matrix addition**矩阵加法: see page 178

**matrix multiplication**矩阵乘法: see page 179

**$I^n$  (identity matrix of order  $n$ )** $n$ 阶单位阵: the  $n \times n$  matrix that has entries equal to 1 on its diagonal and 0s elsewhere

**$A^t$  (transpose of  $A$ )**转置矩阵: the matrix obtained from  $A$  by interchanging the rows and columns

**symmetric matrix**对称矩阵: a matrix is symmetric if it equals its transpose

**zero-one matrix**0-1矩阵: a matrix with each entry equal to either 0 or 1

**$A \wedge B$  (the meet of  $A$  and  $B$ )** $A, B$ 之交: see page 181

**$A \circ B$  (the Boolean product of  $A$  and  $B$ )**布尔积: see page 182

$A \vee B$  (the join of A and B) A,B之并: see page 181

## RESULTS

The set identities given in Table 1 in Section 2.2

The summation formulae in Table 2 in Section 2.4

The set of rational numbers is countable.

The set of real numbers is uncountable.