A set is finite if

it is either empty or has n elements for some n in N

A set is infinite

if it is not finite

A set S has n elements if

there exists from the set $N_n := \{1,\ldots,n\}$ onto S

$A \setminus (B \text{ inter } C)$

$$= (A \setminus B) \cup (A \setminus C)$$

$$A \setminus (B \cup C)$$

$$= (A \backslash B) \text{ inter } (A \backslash C)$$

Cantors theorem

If A is any set , then there is no surj. of A onto the set P(A) of all subsets of A.

Countable

A set S is said to be countable if it either finite or denumerable.

Denumerable

A set S is said to be denumerable (or countable) if E a bijection of N onto S.

If Am is a countable set for each m in N then...

the union of A :=
U(m=1 to infinite) Am
is countable.

injection and how to prove

whenever x1 \= x2, f(x1) \= f(x2)

show for all x1 and x2 in A, if f(x1) = f(x2) then x1=x2

Principle of Mathematical Induction

Let S be a subset of N that possesses the 2 properties

1) the number 1 belongs to S

2) For every k in N, if k belongs to S, then k+1 belongs to S

Then S = N

Principle of Strong Induction

Let S be a subset of N :

1) 1 belongs to S

2) For every k in N, if $\{1,\ldots,k\}$ belong to S then $k+1$ belongs to S

Then $S=N$

Suppose that S and T are sets and that T c_ S

1) If S is a countable set, then T is a countable set
2) If T is an uncountable set, then S is an uncountable set

surjection

$R(f) = B$

show that each point in B maps to at least one point in A

The following are equivalent

1) S is a countable set
2) E a surj. of N onto S
3) E an inj. of S onto N

The set N …

of natural numbers is an infinite set.

The set N x N …

is denumerable.

The set Q of all rational numbers…

is denumerable.

Triangle Inequality

If a,b is in R, then abs(a+b) =< abs(a) + abs (b)

Uncountable

A set S is said to be uncountable if it is not countable.

Uniqueness Theorem

If S is a finite set, then the number of elements in S is a unique number in N.

Well Ordering property of N

Every non-empty subset of N has a least element