

Reminders

1. Fix issue with temporary access on MyMathLab
2. 1.1, 1.2, 1.3 was due on Friday 01/28
(late submission due Friday 02/04, 11:59 pm)
less 10%
3. Check class notes
4. Study guide for Exam #1 is available on course page
(see class note on D2L)
5. Exam #1 on 02/15
6. 2.1, 2.2 due 02/04

Recall

In 2.1 (Some terminologies and symbols in Set Theory)

- A set is a collection of objects called elements
- we denote set by uppercase letters

Example of listing method

$$A = \{1, 2, 3, 4\}$$

we can have a word description of a set

example

a set of students in math 1010

a set of students in math 1010

Another method to describe a set is the 'set-builder' notation

example $\{x \mid x \text{ is an even counting number}\}$

$\{2, 4, 6, 8, 10, \dots\}$

The cardinal number of a set denotes the number of elements in a set (the cardinality of a set)

Suppose A is a set, $n(A)$ to be the cardinal number of set A

A finite set is a set whose cardinal number is a whole number

An infinite set is a set that is not finite

example of an infinite set $\{2, 4, 6, 8, 10, \dots\}$

Equality of a set

Suppose A, B are sets we say $A = B$ if

- (1) every element in set A is an element in set B
- (2) every element in set B is an element in set A

Exercise
Show that

$A = B$ if $A = \{1, 2, 3, 4\}$, $B = \{2, 4, 1, 3\}$

Solution

- i. every element in A is in B
- ii. every element in B is in A

$$\text{So } A = B$$

What does it mean for two sets to be equivalent

Equivalent set

Suppose A, B are sets, we say A is equivalent to B

$$\text{if } n(A) = n(B).$$

Question

Can we give example of sets that are equivalent but not equal

Answer

$$A = \{1, 2, 3, 4\} \quad B = \{3, 5, 1, 2\}$$

$$n(A) = 4, \quad n(B) = 4 \quad \text{so } A \text{ is equivalent to } B$$

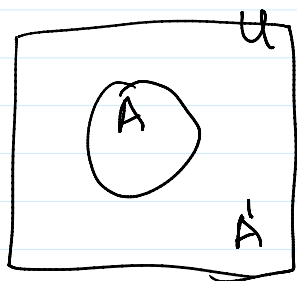
$$4 \in A \text{ but } 4 \notin B \quad \text{so } A \text{ is not equal to } B$$

Note

If two sets are equal they are also equivalent

Complement of a Set

Let U be a universal set, let U contain another set A



$$A' = \{x \mid x \in U \text{ and } x \notin A\}$$

$$A' = U \setminus A \quad \left(\begin{array}{l} \text{Universal set} \\ \text{minus set } A \end{array} \right)$$

Example

$$\text{Let } U = \{a, b, c, d, e, f, g, h\}$$

$$A = \{a, d, e, f\}$$

$$A' = \{b, c, g, h\}$$

Subset of a Set

Set A is a subset of set B if every element in A is an element in B

$$A \subseteq B$$

Examples

$$1. \quad A = \{1, 2, 6\}, \quad B = \{2, 4, 6, 8\}$$

state true or false $A \subseteq B$ (False)

$$2. \quad A = \{3, 4, 5, 6\}, \quad B = \{3, 4, 5, 6, 8\}$$

state true or false $A \subseteq B$ (True)

Re-state the Equality of a set

Let A, B be sets, we say $A = B$ if

① $A \subseteq B$

② $B \subseteq A$

Proper Subset

Set A is a proper subset of set B if

$$A \subseteq B \text{ and } A \neq B$$

we write $A \subset B$

Example

1. $A = \{5, 6, 7\}$, $B = \{5, 6, 7, 8\}$

Show that $A \subset B$

Answer

$A \subseteq B$ (every element in A is an element in B)

but $8 \in B$ and $8 \notin A$ so $A \neq B$

So $A \subset B$

Listing all subsets of a set

If a set contains n elements then there are

2^n subsets and $2^n - 1$ proper subsets

Example

List all the possible subset of set $A = \{1, 2, 3\}$

