Assignment 1 Supplement 1

Set and Some Set Operations

Concept of Set

For our purpose, a set is an *unordered* collection of *distinct* items. (The items are commonly called elements.)

By *unordered*, it means we don't speak of which element is first, which element is next, which element is last, and so on.

By *distinct*, it means the value of each element does not equal the value of any other element in the collection (*i.e.*, the value of each and every element is *unique --> no duplicates* of any element in the collection).
(NOTE: Must be able to compare items for equality/inequality to deal with item distinctness.)

Examples of sets:

Set of months of the year: {January, February, ..., November, December}.

Set of all integers (conventionally denoted by **Z** in math).

Set of all natural numbers, *i.e.*, nonnegative integers (conventionally denoted by **N** in math).

Set of all real numbers, *i.e.*, numbers with fractional parts (conventionally denoted by **R** in math).

The **empty set** (conventionally denoted by **Ø** in math).

. . .

In general, a set can be *finite* (*e.g.*, set of months of the year above) or *infinite* (*e.g.*, set of all integers above).

The typical computer system, being *digital*, usually deals with sets that are *finite*.

Generative Set Operations

Below are the most important generative operations involving set(s):

union. (Result generated by the operation is also called *union*.)

The union of 2 sets A and B is the set of all elements that are in A or B (or both).

intersect. (Result generated by the operation is called *intersection*.)

The intersection of 2 sets A and B is the set of all elements that are in both A and B.

subtract or ***minus***. (Result generated by the operation is called *difference*.)

The difference of 2 sets A and B, with B subtracted from A, is the set of all elements that are in A except those that are also in B.

The difference of 2 sets A and B, with A subtracted from B, is the set of all elements that are in B except those that are also in A.

Inspection Set Operations

Below are the most important inspection operations involving set(s):

membership.

An item is a member of a set if it belongs to (is in) the set (*i.e.*, if the set contains the item).

subset.

Set A is a subset of set B if all elements of A are also in B.

equality.

Two sets A and B are equal if they have the same elements.

(Since sets are unordered, {1, 2, 3}, {1, 3, 2}, {2, 3, 1}, {2, 1, 3}, {3, 1, 2} and {3, 2, 1} equal one another.)

(For two finite sets A and B that are equal, they each must have the same number of elements and each element in A must also be in B.)

(Two finite sets A and B are equal if they have the same number of elements and one is a subset of the other.)

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