Sets Need to Know

Sets 1

Notation

A set is defined as a collection of well defined objects and must be contained inside brackets $\{\}$.

Note Sets are named using capital letters.

$\in$ is element – part of a set.

$\notin$ is not an element.

$\cup$ is union – everything in two or more sets.

$\cap$ is intersection – common to both sets.

$\subset$ is subset – a set within a set.

$\not\subset$ is not a subset.

$\varnothing = \{\}$ is the null set – a set with nothing in it.

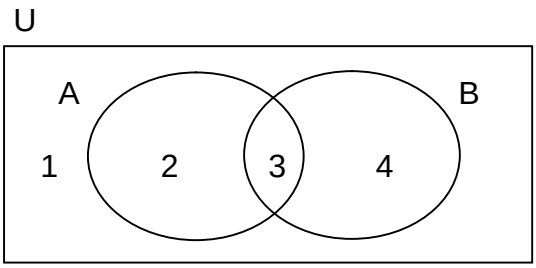
A' is A complement – everything outside the set A.

A\B is A less B – what is in the set A but not including what's in the set B (A only).

#A is cardinal number of A – the number of elements in the set A.

Note Every set has two improper subsets – the null set and the set itself.

Two Set Problems



In the above venn diagram let 1, 2, 3 ,4 stand for the name of each region.

Region 1 = $(A \cup B)' = U \backslash (A \cup B)$ – outside both sets or neither set.

Region 2 = $A \backslash B$ which is A only.

Region 3 = $A \cap B$ which is common to both sets.

Region 4 = $B \backslash A$ which is B only.

Regions 2+3 = A

Regions 3+4 = B

Regions 2+3+4 = $A \cup B$

Max and Min problems

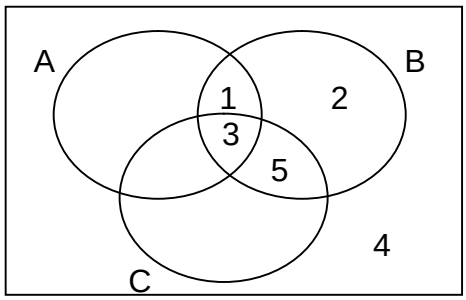
To find the maximum value of $A \cup B$ put the smallest possible number of elements in the intersection.

To find the minimum value of $A \cup B$ put the largest possible number of elements in the intersection.

Sets 2

This class has the harder stuff of three set problems.

Three sets problems



A Venn diagram with 3 sets has extra regions for us to explain.

Region 1 $= (A \cap B) \setminus C$ in both A and B but not C.
Region 2 $= B \setminus (A \cup C)$ in B only.
Region 3 $= A \cap B \cap C$ in all 3.
Region 4 $= (A \cup B \cup C)'$ outside all 3 sets.
Regions 1 and 3 $= A \cap B$
Regions 1, 2, 3 and 5 $= B$