

the language everything after this is written in

What a set is, and the two ways of writing one

- a **set** is a well defined collection: for any object the question does it belong has exactly one answer, which is why the collection of tall people is not a set
- **roster form** lists the members inside braces, **set builder form** states the property, and both describe the same object
- order does not matter and repetition does not count, so the roster of the letters of MISSISSIPPI has just four members
- $\in$ means belongs to and $\subset$ means is a subset of, and confusing an element with a one element set is the commonest early slip

The kinds of set worth naming

- **empty set** has no elements at all, written $\emptyset$, and it is a subset of EVERY set
- **singleton** has exactly one; **finite** and **infinite** by whether the counting stops
- **equal sets** have exactly the same members; **equivalent sets** merely have the same number of members
- **universal set U** is whatever the discussion is confined to, and every complement is taken with respect to it
- **power set P(A)** is the set of ALL subsets of A, and it has 2^n members when A has n. It always contains the empty set and A itself

The counting facts

subsets of a set of n elements

2^n

proper subsets

$2^n - 1$, since A itself is excluded

subsets of size r

$C(n, r)$

two sets

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$

three sets

$$n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(B \cap C) - n(C \cap A) + n(A \cap B \cap C)$$

the two set formula is the three set one with every term containing C deleted, so learn the longer one and read the shorter off it