Some Set Notation for Probability

Basic Notation:

Sets are denoted by upper-case Latin letters like A, B, C, ... (usually, but we use whole words sometimes)
The sample space is usually denoted by S. It corresponds to the universal set of set theory. (The sample space depends on the particular random process or experiment, and there may be more than one possible choice of sample space. In any particular example we fix the choicce of sample space.)

When necessary, we denote general elements of sets by lower-case Latin letters like a, b, c,...

If we wish to describe a set by listing its elements, braces are used:
$\{a, b, c\}$ is the set whose elements are a, b, and c.
Alternatively, we can describe a set by describing its elements inside braces as follows: $\{x | x \text{ is a real number, } x \geq 3\}$ is the set of all real numbers which are greater than or equal to 3.

The set which contains no elements is called the **empty set** or the **null set**. It is denoted by $\{\}$ or by $\emptyset$. Warning: Do not confuse the empty set with the number 0.

Set operations

Union: $A \cup B$ denotes the **union** of the sets A and B, namely, the set which contains all elements which are either in A or in B (or both). It is sometimes called "A or B".

Intersection: $A \cap B$ denotes the **intersection** of A and B, namely, the set of all elements which are in A and also in B. Note that an element of the intersection must be in both sets. (Both restrictions must hold.) It is sometimes called "A and B".

Complement: A' (or $\bar{A}$ or A^c or $\tilde{A}$ or or $\neg A$ in symbolic logic) denotes the **complement** of A, namely the set of all elements of the sample space S which are not in A. It is sometimes called "not A".

DeMorgan's Laws: These are distributive laws for the operation of taking a complement:

$(A \cap B)' = A' \cup B'$

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Subsets
Definition: A is a subset of B if and only if every element of A is an element of B. In other words, A does not contain any elements which are not in B. **Notation** $A \subset B$. It follows that:

$\emptyset \subset A$ for any set A

$A \subset S$ for any set A

$A \subset A$ for any set A

Note: sometimes $\subset$ is used to indicate only **proper subset**, that is, that the set on the left is not the same as the set on the right, and then the symbol $\subseteq$ is used to indicate the possibility that the two sets are the same. We are following the convention used in the textbook, so for us $\subset$ includes the possibility that the sets are the same, as indicated by the list above.