Learning Enhancement Team

University of East Anglia

STUDENT SUPPORT SERVICE

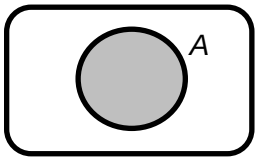
Factsheet: Sets

Special sets, common notation and definitions

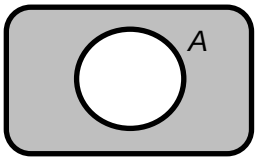
$\mathbb{N}$	the set of **natural** or **counting** numbers:	e.g. 7 …
$\mathbb{Z}$	the set of **integers**:	e.g. ±7 …
$\mathbb{Q}$	the set of **rational** numbers or **fractions**:	e.g. ±7, ½
$\mathbb{R}$	the set of **real** numbers:	e.g. ±7, ½, $\sqrt{2}$, π
$\mathbb{C}$	the set of **complex** numbers:	e.g. ±7, ½, $\sqrt{2}$, π, i, 7 + i
U	the **universal** set	
$\varnothing$	the **empty** or **null** set	

Other sets are denoted by A, B and so on and their elements by a, b and so on.
The **cardinality** of a set is the number of elements in a set and, for a set A is written $|A|$.
"Is an element of a set" is written $\in$ so $a \in A$ means a is an element of set A.
"Is not an element of a set" is written $\notin$ so $a \notin A$ means a is not an element of set A.

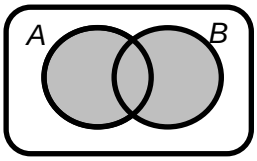
Useful Venn diagrams



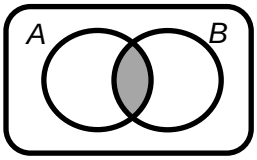
Set A is shaded



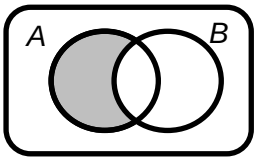
The **complement** of A, A^c is shaded



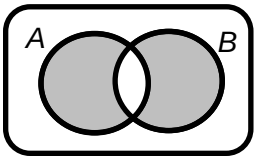
The **union** of A and B, $A \cup B$ is shaded



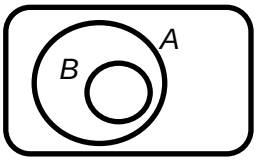
The **intersection** of A and B, $A \cap B$ is shaded



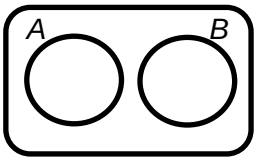
The **relative complement** of A and B, $A \setminus B$ is shaded



The **symmetric difference** of A and B, $A \oplus B$ is shaded



B is a **subset** of A, $B \subseteq A$



A and B are **disjoint:** $A \cap B = \varnothing$

Algebraic Laws of Sets

1.	Idempotent Laws	(i)	$A \cup A = A$	(ii)	$A \cap A = A$
2.	Associative Laws	(i)	$(A \cup B) \cup C = A \cup (B \cup C)$		
		(ii)	$(A \cap B) \cap C = A \cap (B \cap C)$		
3.	Commutative Laws	(i)	$A \cap B = B \cap A$	(ii)	$A \cup B = B \cup A$
4.	Distributive Laws	(i)	$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$		
		(ii)	$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$		
5.	Identity Laws	(i)	$A \cup \varnothing = A$	(ii)	$A \cup U = U$
		(iii)	$A \cap U = A$	(iv)	$A \cap \varnothing = \varnothing$
6.	Complement Laws	(i)	$A \cup A^c = U$	(ii)	$A \cap A^c = \varnothing$
		(iii)	$U^c = \varnothing$	(iv)	$\varnothing^c = U$
7.	Involution Law		$(A^c)^c = A$		
8.	De Morgan's Laws	(i)	$(A \cup B)^c = A^c \cap B^c$		
		(ii)	$(A \cap B)^c = A^c \cup B^c$		

Power set

The power set of A, written $P(A)$, is the set that contains all the subsets of A as elements. $\varnothing \in P(A)$ and $|P(A)| = 2^n$ if A has n elements.

Want to know more?

If you have any further questions about this topic you can make an appointment to see a **Learning Enhancement Tutor** in the **Student Support Service**, as well as speaking to your lecturer or adviser.

◑ Call: 01603 592761
💻 Ask: ask.let@uea.ac.uk
🖱 Click: https://portal.uea.ac.uk/student-support-service/learning-enhancement

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