Esssentials of Applied Data Analysis
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Handout - The Basics of Set Theory

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Set Theory

Basic notions and notation of set theory.

First concepts and notation

- Sets are a list or collection of objects.
- These objects are elements.
- $\varnothing$ is the empty set.
- $p \in A$: is p is an element in the set A.
- $A \subset B$: A is a subset of B

Set Theory - operations

- $A \cup B$: union of A and B.
  - $p \in (A \cup B)$: p is an element of A **OR** B.
- $A \cap B$: intersection of A an B.
  - $p \in (A \cup B)$: p is an element of A **AND** B.
- If $A \cap B$ is equal to $\varnothing$, then A and B are **disjoint** sets.

- A^c (A', $\tilde{}A$ or simply *not* A) is the set of all elements that does not belong to A. A_c is the complement of A.

Venn Diagrams

We can represent sets with diagrams. These are called "Venn Diagrams". See Figure 1
and locate the following sets as a quick exercise:

1) $A \cup B$	5) $(A \cup B) \cup C$	9) A^c	13) $((A \cap B) \cap C)^c$
2) $A \cap B$	6) $(A \cap B) \cap C$	10) $(A \cap B)^c$	14) $((A \cup B) \cap C)^c$
3) $A \cup C$	7) $(A \cup B) \cap C$	11) $(A \cup C)^c$	
4) $A \cap C$	8) $(A \cap B) \cup C$	12) $((A \cup B) \cup C)^c$	

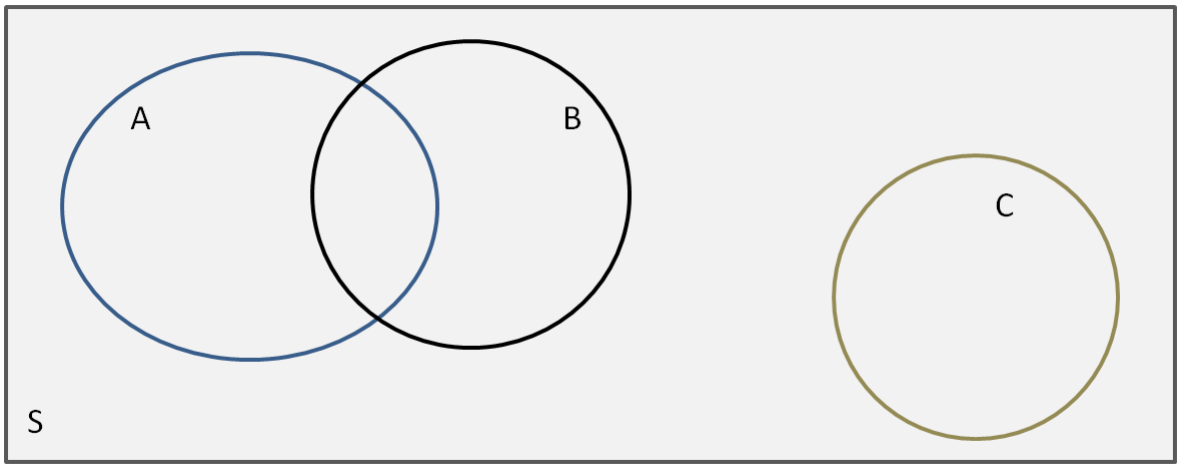

Figure 1: Venn Diagrams