Esssentials of Applied Data Analysis
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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', ˜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 **??** and locate the following sets as a quick exercise:

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

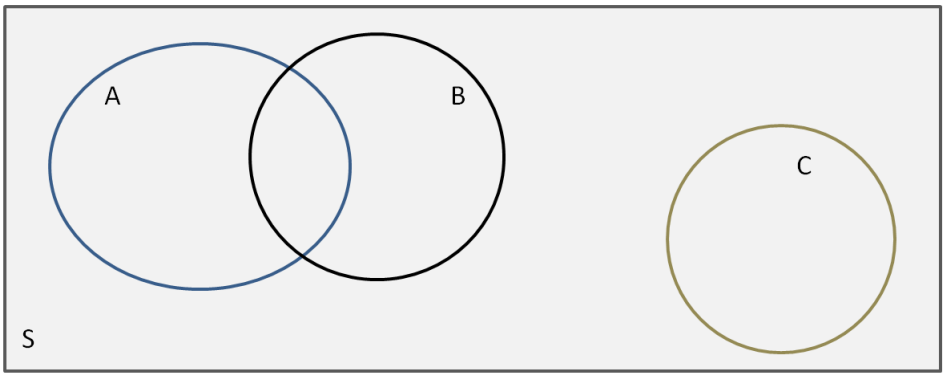

Figure 1: Venn Diagrams