Department of Mathematics
College of William & Mary

MATH 451/551

Chapter 1. Introduction

1.3.2 Algebra of Sets

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Algebra of Sets

Commutativity

$$\begin{aligned} (A \cup B) &= (B \cup A) \\ (A \cap B) &= (B \cap A) \end{aligned}$$

Algebra of Sets

Associativity

$$\begin{aligned} A \cup (B \cup C) &= (A \cup B) \cup C \\ A \cap (B \cap C) &= (A \cap B) \cap C \end{aligned}$$

Algebra of Sets

Distribution Laws

$$\begin{aligned} A \cap (B \cup C) &= (A \cap B) \cup (A \cap C) \\ A \cup (B \cap C) &= (A \cup B) \cap (A \cup C) \end{aligned}$$

Algebra of Sets

DeMorgans Laws

$$
\begin{aligned}
(A \cup B)^c &= (A^c) \cap (B^c) \\
(A \cap B)^c &= (A^c) \cup (B^c)
\end{aligned}
$$

Power Set

Power Set

A **power set** associate with a set A is a set that consists of all possible subsets of A.

1. If $A = \{a, b\}$, what is the power set of A?

2. How many elements are in the power set of $A = \{a, b, c, d, e\}$?

Exclusive OR

Exclusive OR

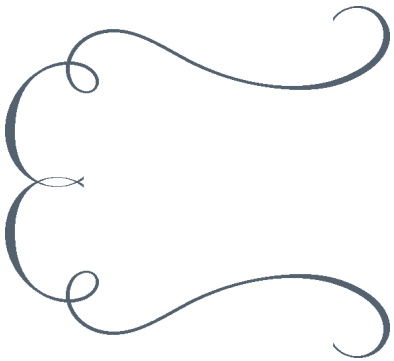
The **exclusive or** operator $\oplus$ for the sets A and B is definedd as

$$A \oplus B = (A \cap B^c) \cup (A^c \cap B).$$

Example

Find $A \oplus B \oplus C$ using Venn diagram.

Thank You



THANK YOU!