CMPE 16 Lecture 3

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1 Set Operation

1.1 Intro

- For sets A and B, the $\cup$ of A and $B = \{x : x \in Aorx \in B\}$
- The intersection of A and $B = \{x : x \in Aandx \in B$
- The difference of A and B, $A - B = \{x : x \in Aandx \notin B$
- $\mathbb{Z} - \mathbb{N} = \{x : x \in \mathbb{Z} \text{ and } x \leq 0\}$

1.2 Compliments

The complement of $A = \bar{A} = \{x : x \in \mathbb{U} \text{ and } x \notin A\}$
Notice that to perform a complement operation you need to understand what the universe is. The answer depends on wether the universe is $\mathbb{R}^2$ or $\mathbb{N}$.

- $A - B = A \cap \bar{B}$
- $\overline{A \cap B} = \bar{A} \cup \bar{B}$ (DeMorgans Law)
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Examples :

- $\sigma = \{2n + 1 : n \in \mathbb{Z}$ (odd numbers)
- $\mathbb{P} = \{n \in \mathbb{Z} : n > 1$, n has no factor between 1 and n $\}$
- $S = \{n^2 : n \in \mathbb{N}\}$ = positive squares (0 is not in there)
- 9 is the only square that is a multiple of 9 false, $S \cap \mathbb{N} = \{9\}$
- $\mathbb{N} \cap \mathbb{P}$
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2 Index Sets

$\sum_{i=1}^{n} i = 1 + 2 + 3 \ldots, +n$ So for instance, we could write the natural numbers as

$$\mathbb{N} = \cup_{i=1}^{\infty}\{i\}$$

And the Integers as

$$\mathbb{Z} = \{0\} \cup (\cup_{i=0}^{\infty})\{-i, i\}$$