

Complement

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- ▶ The complement of a set is defined when our given set is understood to be a subset of some much larger set called the **universe** or **universal set**.
- ▶ When X is a set and its universal set U is specified (or understood) then the **complement** \overline{X} is the set $U - X$.

Example

- ▶ P is the set of prime numbers, with universal set $U = \mathbb{N}$. What is \overline{P} ?

Example

$X = (1, 3) \times [1, 2]$ in \mathbb{R}^2 , with universal set $U = \mathbb{R}^2$. Sketch \overline{X} .

Example

Suppose:

- ▶ $A = \{x : x \in \mathbb{N}, x \text{ is even and } 0 \leq x \leq 8\}$
- ▶ $B = \{x : x \in \mathbb{N}, x \text{ is odd and } 0 \leq x \leq 8\}$
- ▶ $U = \{x : x \in \mathbb{N}, 0 \leq x \leq 8\}.$

What is $\overline{A} \cap B$?

Example

$X = \{(x, y) \in \mathbb{R}^2 : y < x^2\}$ with universal set \mathbb{R}^2 . Sketch \overline{X} .