Definition: $\bigcup A = \{x : \exists y\ x \in y \in A\}$.
Exercises.

$\bigcup \{[0, 1/n] : n = 1, 2, 3, \ldots \} = [0, 1]$

$\bigcup \{[0, n] : n \in \mathbb{N}\} = \mathbb{R}^{\geq 0}$

$\bigcup \{(1/n, 1) : n = 1, 2, 3, \ldots \} = (0, 1)$

$\bigcup \{[1/n, 1] : n = 1, 2, 3, \ldots \} = (0, 1)$

$\bigcup \{[n, 2n] : n = 1, 2, 3, \ldots \} = \{0\} \cup [1, \infty)$

$\bigcup \{p\mathbb{Z} : p \text{ prime} \} = \mathbb{Z} \setminus \{-1, 1\}$

$\bigcup \{[1/n, 1 - 1/n] : n = 1, 2, 3, \ldots \} = (0, 1)$

$\bigcup \{(\infty, 1 - 1/n] \cup [1 + 1/n, \infty) : n = 1, 2, 3, \ldots \} = \mathbb{R} \setminus \{1\}$

$\bigcup \{[n , n^2] : n = 1, 2, 3, \ldots \} = [2, \infty) \cup \{0, 1\}$

$\bigcup \{[n, n^3]: n \in \mathbb{Z} \} = [2, \infty) \cup \{-1, 0, 1\}$

$\bigcup \{p\mathbb{Z} : p \text{ odd prime} \} = \mathbb{Z} \setminus \{\pm 2^n : n \in \mathbb{N} \}$

$\bigcap \{p\mathbb{Z} : p \text{ prime}\} = \{0\}$

$\bigcap \{[n - 1/n, 1 + 1/n] : n = 1, 2, 3, \ldots\} = \{1\}$

$\bigcap \{(1 - 1/n , 1 + 1/n) : n = 1, 2, 3, \ldots\} = \{1\}$

$\bigcap \{(1 - 1/n, 2 + 1/n) : n = 1, 2, 3, \ldots\} = [1, 2]$

$\bigcap \{[n, \infty) : n = 1, 2, 3, \ldots\} = \emptyset$