Indexed families

Exercise 1: Define $C_n = [n, n + 1)$ for all $n \in \mathbb{Z}$. Prove the collection:

$$\mathcal{C} = \{C_n : n \in \mathbb{Z}\}$$

is pairwise disjoint.

Exercise 2: Let the universe be $\mathbb{R}$. Denote:

$$\mathcal{C} = \left\{ A_n = \left[ \frac{1}{n}, 2 - \frac{1}{n} \right] : n \in \mathbb{N} \right\}$$

Prove:

(a) $\bigcap_{n \in \mathbb{N}} A_n = \{1\}$

(b) $\bigcup_{n \in \mathbb{N}} A_n = (0, 2)$

More set theory practice

Exercise 3: Let $A, B$ be sets. Prove:

(i) $A \subseteq B$ if and only if $B^c \subseteq A^c$

Exercise 4: What is the power set of $\{a, b, \{c, d\}\}$? What is the size of the powerset of $\{a, b, \{c, d\}\}$?