Homework 3 Foundations 2/16/07

1. Suppose $A_n = [0, n]$. What is $\bigcup_{n\in\mathbb{N}} A_n$?

2. Suppose $A_n = [0, n]$. What is $\bigcap_{n\in\mathbb{N}} A_n$?

3. Suppose $B_n = \{m \in \mathbb{N} \mid -n < m < n\}$. What is $\bigcup_{n\in\mathbb{N}} B_n$?

4. Suppose $B_n = \{m \in \mathbb{N} \mid -n < m < n\}$. What is $\bigcap_{n\in\mathbb{N}} B_n$?

5. Suppose $C_n = \left(\frac{-1}{n}, \frac{1}{n}\right)$. What is $\bigcup_{n\in\mathbb{N}} C_n$?

6. Suppose $C_n = \left(\frac{-1}{n}, \frac{1}{n}\right)$. What is $\bigcap_{n\in\mathbb{N}} C_n$?

7. Suppose $D_n = \{n^p \mid p \in \mathbb{N}\}$. What is $\bigcup_{n\in\mathbb{N}} D_n$?

8. Suppose $D_n = \{n^p \mid p \in \mathbb{N}\}$. What is $\bigcap_{n\in\mathbb{N}} D_n$?

9. Let $\{E_\alpha \mid \alpha \in \Lambda\}$ be an indexed family of sets. Show that for each $\beta \in \Lambda$, $E_\beta \subseteq \bigcup_{\alpha\in\Lambda} E_\alpha$.

10. Let $\{E_\alpha \mid \alpha \in \Lambda\}$ be an indexed family of sets. Show that for each $\beta \in \Lambda$, $\bigcap_{\alpha\in\Lambda} E_\alpha \subseteq E_\beta$.

Let $F = \{1, 2, 3\}$, $G = \{a, b\}$, $H = \{\alpha , \beta\}$, $I = (0,1)$.

11. What is $F \times G$?

12. What is $H \times H$?

13. What is $F \times F$?

14. What is $G \times G \times G$?

15. What is $I \times I$?

16. What is $F \times I$?