

Math 220-Homework 5

Due Thursday 02/26 at the beginning of class

PART A

Problems from the textbook:

- Section 2.2 #16, 17, 18, 23, 26
- Section 2.3 # 2, 4, 5(b,c,e,f), 11, 14, 23.

PART B

1. Determine the truth or falsehood of the following statements. (Write TRUE or FALSE for each statement.)
 - (a) $A \times B = B \times A$ for all nonempty sets A and B .
 - (b) If A is not a subset of B and B is not a subset of A , then $A \cap B = \emptyset$.
 - (c) For all sets A , B , and C , $A \cup (B \cap C) = (A \cap C) \cup (B \cap C)$.
 - (d) $7 \notin \{\{-1, 7\}, \{-7, 2015, 0\}, \{1, 2\}\}$.
 - (e) $A \cup A = A \cap A$ for all sets A .
 - (f) If $A = \{a, \{a, b, c\}\}$ and $B = \{\{c, d\}, \{a, b, c, d\}\}$ then $|A| = |B|$.
 - (g) If $\{1\} \in P(A)$, then $1 \in A$ and $\{1\} \notin A$.
2. For the sets $A = \{a, b\}$ and $B = \{0, 1\}$ form the following Cartesian products:
 - (a) $B \times A$
 - (b) $B \times A \times B$.
3. Find $|A|$, where $A = \{(x, y) \in \mathbf{Z} \times \mathbf{Z} \mid |x| + |y| = 3\}$.
4. Let $U = \{1, 2, 3\}$ be the universal set and let $A = \{1, 2\}$, $B = \{2, 3\}$, $C = \{1, 3\}$. Determine the following:
 - (a) \overline{A}
 - (b) $\overline{B \cup C}$
 - (c) $(A \cup B) - (B \cap C)$
5. Let $A = \{a, b, c\}$.
 - (a) Write out all the different partitions of the set A .
 - (b) Write out the power set, $P(A)$, for A .
6. Describe two partitions of the set $\{x \mid x \text{ is an integer}\}$.
7. For each $n \in \mathbf{Z}^+$, define $A_n = \{n, 2n\}$. Let $I = \{1, 2, 4\}$. Find $\bigcup_{\alpha \in I} A_\alpha$.
8. For each $n \in \mathbf{Z}^+$, define $A_n = \left\{x \in \mathbb{R} \mid -\frac{1}{n} \leq x \leq 2 - \frac{1}{n}\right\}$. Let $I = \{1, 2, 4\}$. Find $\bigcup_{i=1}^{\infty} A_i$ and $\bigcap_{i \in \mathbf{Z}^+} A_i$.