

Math 220/903&904-Homework 3

Due Wednesday 09/30 at the beginning of class

PART A

Problems from the textbook:

Section 2.1 # 1(b, c, e, i); 2(b, f, h); 4(b, c, f, i); 5; 7(e, f, h); 8(b, c, d); 13; 14; 15; 19(b, c); 20(c, f).

Section 2.2 # 4(b, e), 5(b, e), 6,

PART B

- Determine the truth or falsehood of the following statements.
 - The contrapositive of the statement
 “If all elements of A are elements of B , then A is a subset of B ”
 is the statement
 “If A is a subset of B , then all elements of A are elements of B ”.
 - $\{a, b\} = \{b, a, b\}$
 - $\{x \in \mathbb{N} \mid -x \in \mathbb{N}\} = \emptyset$.
 - If $A = \{m \in \mathbb{Z} \mid 2 < m \leq 5\}$ then $|A| = 4$.
 - The empty set is a subset of every set except itself.
- Let A, B , and C be nonempty sets. Determine the truth or falsehood of the following statements. (Write TRUE or FALSE for each statement.)
 - $A - A = \emptyset$.
 - $A \subset A$.
 - $A - B = C - B$ implies $A = C$.
 - If A is not a subset of B and B is not a subset of A , then $A \cap B = \emptyset$.
 - $A \cup (B \cap C) = (A \cap C) \cup (B \cap C)$.
 - $A \cup A = A \cap A$ for all sets A .
- Let $U = \{x, y, 1, 2, 3\}$ be the universal set and let $A = \{x, y, 1, 2\}$, $B = \{2, 3\}$, $C = \{1, 3, x, y\}$. Determine the following (show all intermediate steps):
 - $\overline{A} \cup (B \cap C)$
 - $\overline{B \cup C} \cap U$
 - $\overline{(A \cup B) - (B \cap C)}$
- Disprove the following statement:
 ‘‘Let A, B , and C be nonempty subsets of a universal set U .
 Then $A \cap B = A \cap C$ implies $B = C$.’’
- Let $U = \mathbb{R}$ be the universal set. Consider $A = \{x \in \mathbb{R} \mid |2x + 3| \geq 7\}$ and $B = \{x \in \mathbb{R} \mid |x| \leq 1\}$.
 - Express the sets A and B using interval notation (as an interval or a union of intervals).
 - Determine $\overline{A} \cap B$ as an interval or a union of intervals.