

## **Fall 2024 COT 3100 Homework #2**

1) Let  $A = \{2, 3, 4\}$  and  $B = \{1, 2, 4, 16, 27\}$ . Explicitly list the members of the following sets:

$$A \cup B, A \cap B, A - B, B - A, A \times B, \emptyset(A)$$

2) Use the Set Table method to show that the following two sets are equal:

$$A \cap (B \cup (A \cap \bar{B})) \text{ and } A$$

3) Use the Laws of Set Theory to show that the sets from question 2 are equal.

For questions 4 – 7, do not use the Set Table or Set Laws explicitly. Write them out using the other various methods shown in class.

4) Prove or disprove the following assertion about finite sets A, B and C:

$$\text{If } A \subseteq B, \text{ then } A - C \subseteq B - C.$$

5) Prove or disprove the following assertion about finite sets A, B and C:

$$\text{If } A - C \subseteq B - C, \text{ then } A \subseteq B.$$

6) Prove or disprove the following assertion about finite sets A, B, C and D:

$$(A \cup B) \times (C \cup D) = (A \times C) \cup (A \times D) \cup (B \times C) \cup (B \times D)$$

Note: This question is lengthy because it requires two directions of proof, showing that the left is a subset of the right AND that the right is a subset of the left.

7) Prove or disprove the following assertion about finite sets A, B and C:

$$(A - C) - (B - C) \subseteq (A - B)$$

8) Determine, the number of integers in between 1 and 10,000,000 that are divisible by 6, 21 or 77?