Score: /25

CS 222
Spring 2021

Name: _____

Homework 1: Set Theory

Due date: Friday 2/5 Submit the assignment via Canvas Assignments. Upload homework as one pdf document. A scanner app like Cam Scanner will make this possible.

Print and write work on this worksheet. Write clearly and show **all work** for full credit.

True or False. (1 point each)

1. _____ $45 \in \{1, 3, 5, 7, 9, \dots\}$

2. _____ $8 \notin \{x | x \in \mathbb{N} \wedge x \geq 8\}$

3. _____ $\{b, c, d\} \subseteq \{b, c, d\}$

4. _____ $\{\ \} \subset \{\ \}$

5. _____ for any set S, $\emptyset \subseteq S$

6. _____ $T \subseteq S \text{ and } S \subseteq T \text{ if and only if } S = T$

7. _____ $|\{1,2,3\}| = |\{1,2,\{3,4\}\}|$

8. Edit the false statements in #1-7 to make them true. Answers may vary. (2 points)

9. Let $A = \{x | x, k \in \mathbb{N},\ x = k^3,\ k < 4\}$. List all the subsets of *A*. (2 points)

10. Consider some set, T, created by the formula 3^n, where n is a natural number and $n \geq 1$. Provide three representations:

a. Enumeration (2 points)

b. Formal Rule (2 points)

c. Recursive Formula (2 points)

11. Let $\mathbb{U} = \{0, 1, 2, \ldots, 10\}$, $A = \{0, 2, 4, 6, 8, 10\}$ and $B = \{0, 1, 2, 3, 4, 5, 6\}$. Find:

d. $\overline{A \cup B}$ (2 points)

e. $\bar{A} \cap \bar{B}$ (2 points)

12. Use a membership table to establish $\overline{A \cup B} = \bar{A} \cap \bar{B}$ (4 points)
