

HOMWORK 1

- 1) In Chapter 0 under the heading “Using Symbols” state numbers 3 and 8 in your own words.
- 2) In Chapter 0 under the heading “Common Words and Phrases” state numbers 3 and 6 in your own words.
- 3) Write each of the following sets by listing the elements with braces.
 - a) $A = \{x \in \mathbb{R} : x^2 = 4\}$
 - b) $B = \{n \in \mathbb{Z} : n^3 < 30\}$
 - c) $C = \{x \in \mathbb{R} : x^2 + 1 = 0\}$
 - d) $D = \{n \in \mathbb{N} : |n| \leq 5\}$
- 4) Write each of the following sets in the form $\{x \in S : p(x)\}$ where $p(x)$ is a property on x and $S = \{-4, -3, -1, 0, 1, 4\}$.
 - a) $A = \{-1, 0, 1\}$
 - b) $B = \{-4, -3, -1\}$
 - c) $C = \{-1, 1\}$
 - d) $D = \{-4, -3, 4\}$
- 5) Give examples of sets $A, B,$ and C such that the following hold. In each example it must be clear to the grader that you understand the properties required.
 - a) $A \in B$ and $A \subset C$
 - b) $A \subseteq B, A \in C$ and $B \cap C \neq \phi$
 - c) $A \subset C, B \subseteq C,$ and $A \cap B = \phi$
 - d) $|A \cap B| = |A - B| = |B - A| = |\overline{A \cup B}| = 2$ and $C = U$ the universal set.
- 6) Let $A = \{\phi, \{\phi\}, \{\phi, \{\phi\}\}\}$. (For $d - g$ determine the set indicated.)
 - a) Determine $|A|$.
 - b) List the elements of A .
 - c) List all possible subsets of A .
 - d) $\phi \cap A$
 - e) $\{\{\phi\}\} \cap A$
 - f) $\{\phi\} \cup A$
 - g) $\{\phi, \{\{\phi\}\}\} \cup A$
- 7) Let $U = \{a, b, c\}$ be the universal set, and let $A = \{a, b\}, B = \{b, c\},$ and $C = \{a, c\}$. Determine the following:
 - a) $(A \cup B) - (B \cap B)$
 - b) \overline{A}
 - c) $\overline{(B \cup C)}$
 - d) $A \times B$

- 8) Which of the following are statements? State whether the statements are True or False.
- a) 7 is even.
 - b) $3 + 4 = 20$
 - c) $5x + 7 = 1$
 - d) multiply 7 and 11
- 9) Which of the following are true? Explain each of your answers.
- a) $\phi \in \phi$
 - b) $\phi \subset \{\phi\}$
 - c) $2 \subseteq \{2\}$
 - d) $\phi \in \{1\}$
- 10) Negate each of the following. You should remove 'not' from your sentences.
- a) π is rational.
 - b) Zero is not a negative number.
 - c) Seven is even.
 - d) 22 is prime.

Not collected Book problems: 1.1, 1.5, 1.7, 1.11, 1.19, 1.41, 2.1, 2.3, 2.5, 2.8