MATH 3503: Tashfeen's Discrete Mathematics

Homework 2

Question 1. Please read chapter 2 of Chartrand et al. and write a couple sentences about a topic/example/concept that you found difficult or interesting and why?

Question 2. How many elements are in $\mathcal{P}(A)$ if $A = \{n \in \mathbb{Z} : |n| \leq 5\}$?

Question 3. Let $A = \{0, \{0\}, \{0, \{0\}\}\}$.

(a) Determine which of the following are elements of $A : 0, \{0\}, \{\{0\}\}$.
(b) Determine $|A|$.
(c) Determine which of the following are subsets of $A : 0, \{0\}, \{\{0\}\}$.

For (d)-(i), determine the indicated sets.

(d) $\{0\} \cap A$.
(e) $\{\{0\}\} \cap A$.
(f) $\{\{\{0\}\}\} \cap A$.
(g) $\{0\} \cup A$.
(h) $\{\{0\}\} \cup A$.
(i) $\{\{\{0\}\}\} \cup A$.

Question 4. For two sets A and B of real numbers, the set $A \cdot B$ is defined by,

$$A \cdot B = \{ab : a \in A, b \in B\}.$$

Determine each of the following sets.

1) $A \cdot B$ for $A = \{\frac{1}{2}, 1, \sqrt{2}\}$ and $B = \{\sqrt{2}, 2, 4\}$.
2) $\mathbb{R} \cdot \mathbb{R}$.
3) $\mathbb{R} \cdot C$ where $C \subseteq \mathbb{R}$ with $|C| = 2$.

Question 5. For $A = \{1, 2\}, B = \{-1, 0, 1\}$ and the universal set $U = \{-2, -1, 0, 1, 2\}$, determine

(a) $A \cup B$.
(b) $A \cap B$.
(c) $A - B$.
(d) $\overline{B}$.
(e) $A \times B$.

Question 6. Give examples of three sets A, B and C such that

(a) $A \subseteq B \not\subset C$.
(b) $A \subseteq B, B \in C$ and $A \cap C = \varnothing$.
(c) $A \in B, A \subset B$ and $A \not\subseteq C$.
(d) $A \in B, A \not\subseteq B$ and $B \in C$.