

Math 135: Discrete Mathematics, Spring 2010

Worksheet 4

1. Let $A = \{0, 1, 2, 3, 4, 5, 6\}$.

(a) Match each of the sets on the left with the appropriate set on the right. Not every set on the right will be used.

(1) $\{2k + 2 : k \in A\}$

(2) $\{2m : m \in A\}$

(3) $\{n : n - 2 = 4L \text{ for some } L \in A\}$

(4) $\{4p : p \in A\}$

(a) $\{-2, 2, 6, 10, 14, 18, 22\}$

(b) $\{0, 4, 8, 12, 16, 20, 24\}$

(c) $\{4, 8, 12, 16, 20, 24, 28\}$

(d) $\{0, 2, 4, 6, 8, 10, 12\}$

(e) $\{2, 6, 10, 14, 18, 22, 26\}$

(f) $\{2, 4, 6, 8, 10, 12, 14\}$

(b) Express the set $\{n \in A : \exists a \in A \text{ such that } na = 12\}$ using an explicit list.

(c) Express the set $\{m \in A : \forall a \in A, m + a \neq 6\}$ using an explicit list.

2. Decide if the following properties hold for sets. (Hint: Use Venn diagrams to compare them - I'm not looking for proofs here.)

(a) $A \cap (B \cup C) = (A \cap B) \cup C$

(b) $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$

(c) $(B \cap C) - A = B \cap (C - A)$

3. Prove the following statements.

(a) If $A \cap B = A$, then $A \cup B = B$.

(b) If $A \subseteq B$, then $(A \times C) \subseteq (B \times C)$.

(c) $\mathcal{P}(A) \cup \mathcal{P}(B) \subseteq \mathcal{P}(A \cup B)$, and then give an example to show that the two are not equal.