

1. 10 pts. each Express each set in roster form. (Note: \mathbb{N} is the set of natural numbers.)
 - (a) The set of integers between -2 and 5 .
 - (b) $E = \{x \mid x \in \mathbb{N} \text{ and } 3 \leq x < 17\}$
 - (c) $S = \{x \mid 2x + 3 = 17\}$

2. 10 pts. each Express each set in set-builder notation.
 - (a) $A = \{5, 6, 7, 8, 9, 10, 11, 12, 13, 14\}$.
 - (b) B is the set of even natural numbers.

3. 5 pts. each State whether each statement is true or false. If false, give the reason. (Note: \emptyset is the empty set.)
 - (a) $\{\#\} \in \{\$, \&, \%, @, \#, =\}$
 - (b) $\lambda \notin \{\alpha, \beta, \gamma, \delta, \epsilon, \zeta\}$
 - (c) $\boxplus \subset \{\boxplus, \square, \boxminus, \boxtimes, \boxdot, \boxtimes\}$
 - (d) $\emptyset \subset \emptyset$

4. 10 pts. List all the proper subsets of the set $C = \{\otimes, \sqcup, \times\}$.

5. 10 pts. each Determine each set, given that

$$U = \{1, 2, 3, 4, 5, 6, 7, 8\}$$

$$A = \{1, 2, 4, 5, 8\}$$

$$B = \{2, 3, 4, 6\}$$
 - (a) $(A \cup B)'$
 - (b) $A' \cup (A \cap B)$
 - (c) $A - B'$

6. 10 pts. each Determine each set, given that

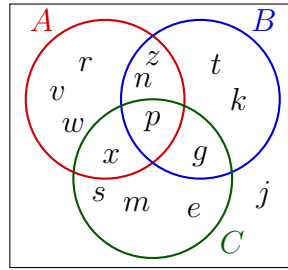
$$U = \{x \mid x \in \mathbb{N} \text{ and } x < 10\}$$

$$A = \{x \mid x \in \mathbb{N}, x \text{ is odd, and } x < 10\}$$

$$B = \{x \mid x \in \mathbb{N}, x \text{ is even, and } x < 10\}$$

$$C = \{x \mid x \in \mathbb{N} \text{ and } x < 6\}$$
 - (a) $(C' \cup A) \cap B$
 - (b) $(A - B)' - C$

7. 15 pts. For $A = \{q, r\}$ and $B = \{4, 6, 8\}$, determine $B \times A$. Also, determine $n(A)$, $n(B)$, and $n(B \times A)$.
8. 10 pts. Use the Venn diagram below to determine the sets $A \cap (B \cup C)$ and $(A' \cup B) \cap C$.



9. 10 pts. each Use Venn diagrams to determine whether the following expressions are equal for all sets A , B , and C .
- (a) $(A' \cap B)'$, $A \cup B'$
- (b) $A \cup (B \cap C)'$, $A' \cap (B \cup C)$
10. Agway Lawn and Garden collected the following information regarding purchases from 138 of its customers:
- 82 purchased shrubs
69 purchased trees
48 purchased shrubs and trees
- Of those surveyed,
- (a) 3 pts. How many customers purchased only shrubs?
- (b) 3 pts. How many customers purchased only trees?
- (c) 4 pts. How many customers purchased neither shrubs nor trees?
11. Three major grain crops raised in the world are wheat, maize, and rice. A survey of 43 countries that raise grain yielded the following results:
- 18 countries raised wheat
16 countries raised maize
12 countries raised rice
9 raised wheat and maize
3 raised maize and rice
3 raised wheat and rice
2 raised all three crops
- (a) 8 pts. Draw a Venn diagram illustrating the information given above.
- (b) 3 pts. How many countries raised none of the three crops?
- (c) 3 pts. How many countries raised exactly one of the crops?
- (d) 3 pts. How many raised wheat and maize, but not rice?
- (e) 3 pts. How many raised maize or rice, but not wheat?