2.3 Set Operations
M. Goodroe - Quantitative Skills and Reasoning

Key Terms:
Union
Intersection
Complement
Difference
DeMorgan's Laws
Inclusion/Exclusion Principle

Name:_____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Let $U = \{q, r, s, t, u, v, w, x, y, z\}$
  $A = \{q, s, u, w, y\}$
  $B = \{q, s, y, z\}$
  $C = \{v, w, x, y, z\}$. **List the elements in the set.**
  1) $A \cap B'$

  2) $(A \cap B)'$

  3) $C' \cup A'$

  4) $A - C$

Describe the indicated set in words and find the set.
  5) $P - (E \cup C)'$, given the following information:
  The table gives features of different dishwasher

model	price (dollars)	clean china	clean glassware	energy efficiency	wa
a	712	excellent	good	good	lo
b	455	excellent	good	fair	m
c	554	excellent	good	good	hi
d	606	excellent	good	good	hi
e	556	good	fair	good	lo
f	385	excellent	fair	good	m
g	480	good	fair	fair	m
h	361	good	fair	fair	m
i	263	fair	poor	good	m

In the universal set $U = \{a, b, c, ..., i\}$, let the following characteristics be defined:
P = price is at or below $455
C = does an excellent job of cleaning china
G = does an excellent job of cleaning glassware
E = has a good energy efficiency rating
F = has low water usage

6) $(P \cup L) - (S \cap C)$, given the following information
The table gives the approximate nutritional value per serving of foods at a certain restaurant.

food	calories	protein (grams)	fat (grams)	c
Chow Mein	240	23	16	
Pizza (cheese)	120	15	9	
Bean Burrito	340	20	4	
Linguini & Meatballs	330	19	13	
Pea Soup	250	7	7	
Chicken Salad	210	33	8	
Ice Cream	270	3	13	

Let:
C = {m : m provides 251 or more calories}
P = {m : m provides 20 or more grams of protein
F = {m : m provides 10 or more grams of fat}
L = {m : m provides 150 or more mg of calcium}
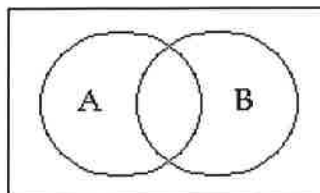S = {m : m provides 1000 or more mg of sodium
A = {m : m provides 1000 or more A.U. of Vitamin A}
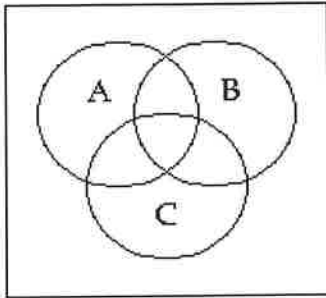
Shade the Venn diagram to represent the set.
  7) $A' \cap B'$

  8) $(A \cup B) \cap (A \cap B)'$

9) $(A \cap B \cap C')'$

Write a description of the shaded region using the symbols A, B, C, ∪, ∩, –, and ' as needed.

10)

11)

12)

Use the Venn diagram below to find the number of elements in the region.

13) $n(A)$

14) $n(C - A)$

15) $n((C \cup B) - (A \cup B))$

Let A and B be sets with cardinal numbers, $n(A) = a$ and $n(B) = b$, respectively. Decide whether the statement is true or false.
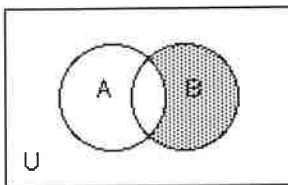
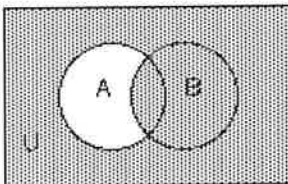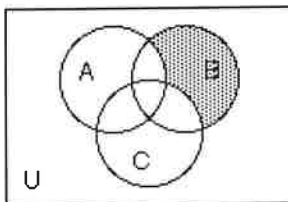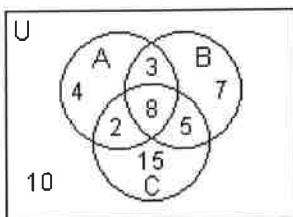16) $B \subset (B \cap A)$

17) If $B \subseteq A$, $n(B) = n(A - B)$.

18) If $B \subseteq A$, $n(B) = n(A) - n(A - B)$.