Section 2.3: Venn Diagram

Example 3:   If $U = \{a, b, c, d, e, f, g, h, i\}$ and $A = \{a, b, c, f\}$, $B = \{b, c, d, e, g\}$ Find:

1) A' ; B'
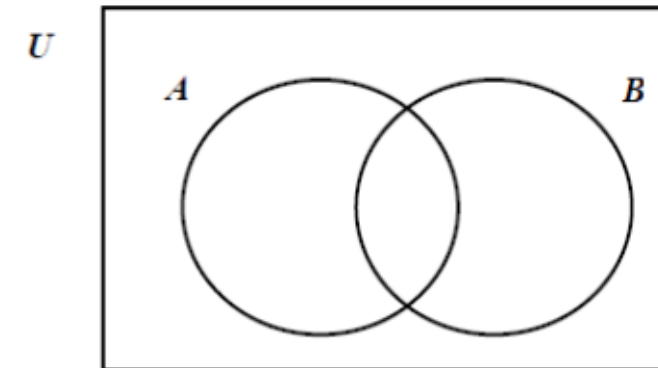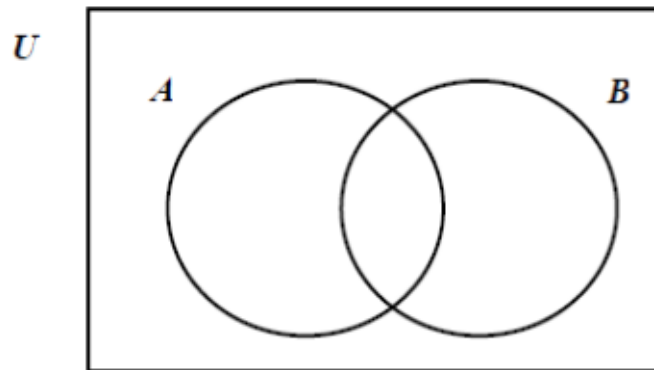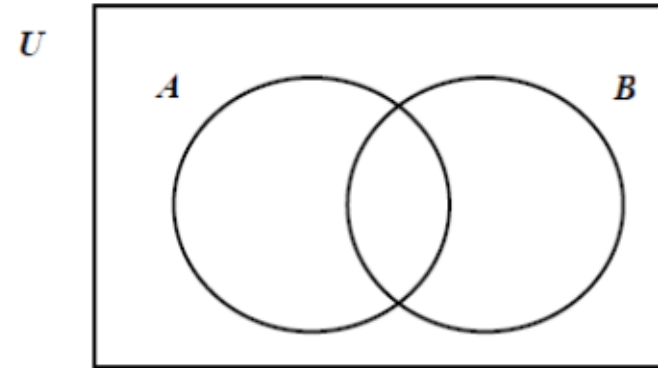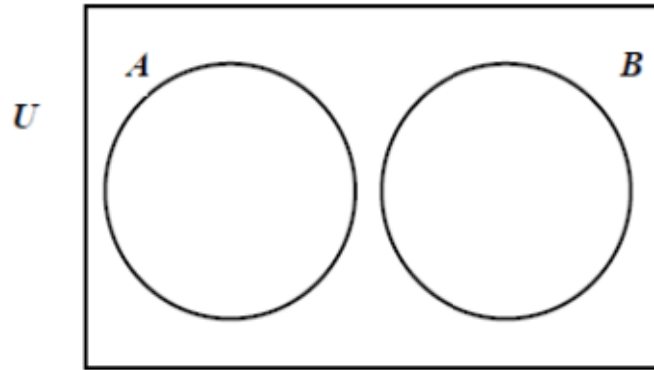
2) $A \cup B$

$(A \cup B)'$

3) $A \cap B$

$(A \cap B)'$

4) $A' \cap B'$

5) $A' \cup B'$

De Morgan Law:	a) $(A \cup B)' = A' \cap B'$
	b) $A' \cup B' = (A \cap B)'$

Example 3 Cont.:   If $U = \{a, b, c, d, e, f, g, h, i\}$ and $A = \{a, b, c, f\}$, $B = \{b, c, d, e, g\}$. Draw the Venn diagram

Example 4: If $U = \{a, b, c, d, e, f, g\}$ and $A = \{a, b, f\}$, $B = \{c, d, e, g\}$ Find:

    1) $A \cup B$

    2) $A \cap B$

Partition: a) Union is all or: $A \cup B = U$

                 b) Nothing in Common or: $A \cap B = \phi$

Example 5: Mark has two sets of courses to choose form:
             Set A = {Chemistry, Math, English} = {C,M,E}
             Set B = {French, History, Geology} = {F,H,G}

    Find:

        a) the number of courses that are in A <u>and</u> B.

        b) the number of courses that are in A <u>or</u> B.

Example 6: Mike has two sets of courses to choose form:

> Set A = {Chemistry, Math, English, History} = {C,M,E,H}
> Set B = {Math, English, French} = {M,E,F}

Find:

a) the number of courses that are in A <u>and</u> B. ☞ $n(A \cap B)$

b) the number of courses that are in A <u>or</u> B. ☞ $n(A \cup B)$

c) the number of courses that are in A only.

$$n(A \cup B) = n(A) + n(B) - n(A \cap B)$$
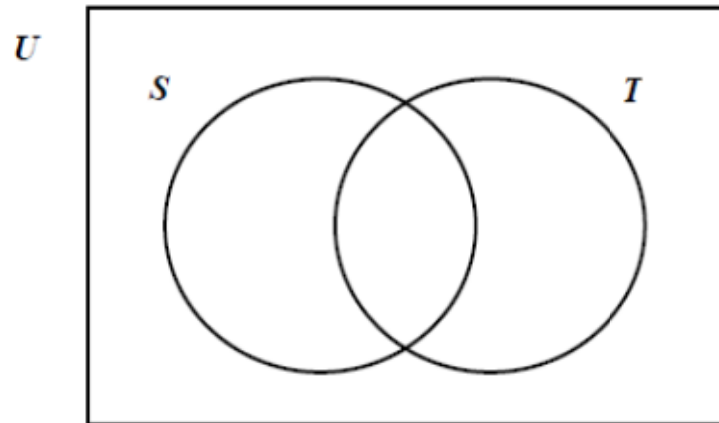
Example 7: In a survey of 80 people, it was found that:

        45 read the Sport magazine (S)

        40 read the Time magazine (T)

        10 read both magazines (T & S)

     Find the number of people that read:

a) Time only   **b) Sport only**   **c) neither magazine**   **d) either magazine**

Example 8: In a survey of 200 people, it was found that:

        150 listen to Rock music (R)

        80 listen to Slow music (S)

        55 listen to Classic music (C)

        60 listen to Rock and Slow music (R & S)

        25 listen to Classic and Slow music (C & S)

        40 listen to Rock and Classic (R & C)

        15 listen to all (R & S & C)

Find the number of people that listen to:

    a) Rock only   **b) 2 kind of music**   **c) Rock and Slow but not Classic**   **d) none**
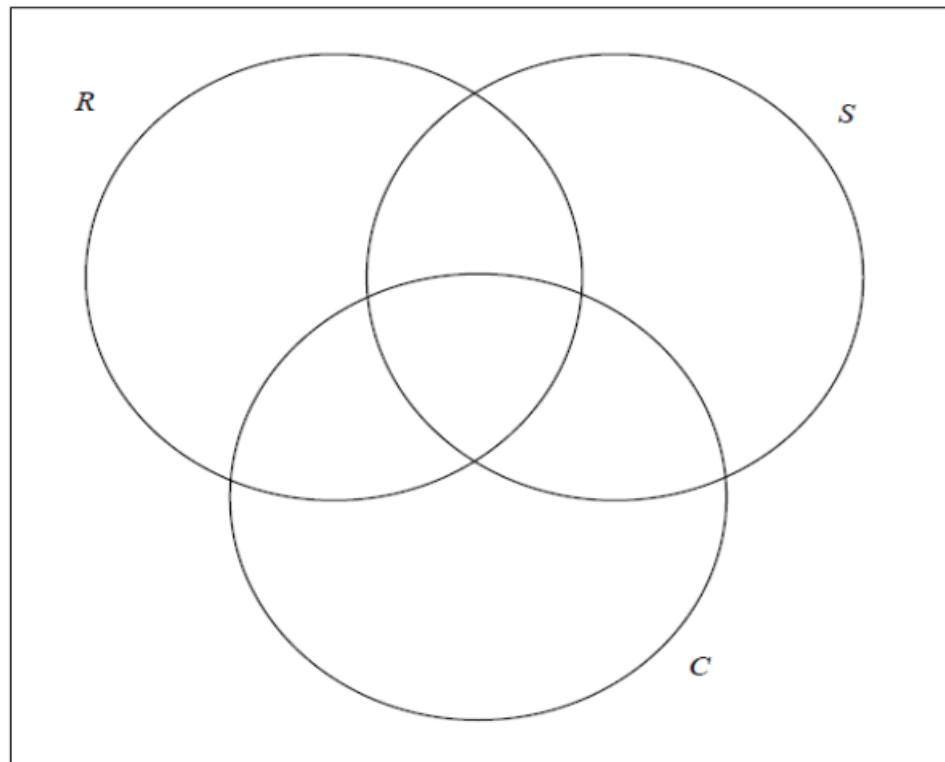
Example 9: In a survey , it was found that:
55 students took History (*H*)
45 students took English (*E*)
25 students took Geography (*G*)
7 students took English and History but not Geography
5 students took Geography and History but not English
3 students took Geography and English but not History
30 students took English only
Find the number of students that took:
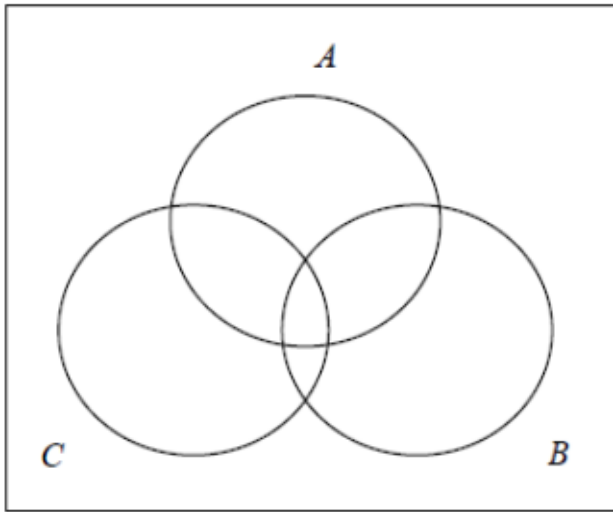**a) the three subjects at the same time   b) History only**
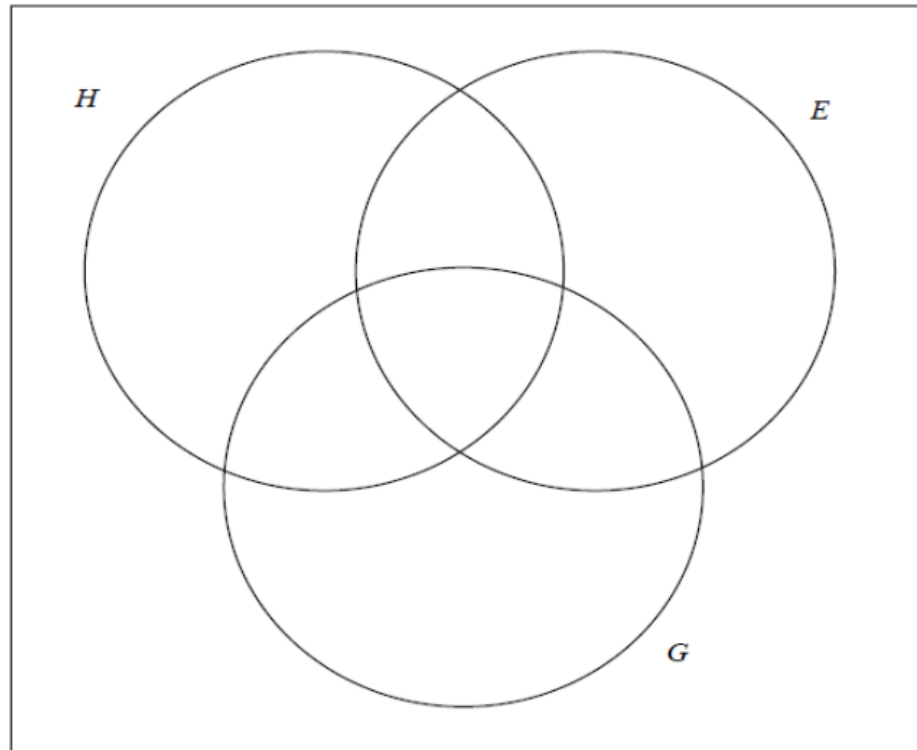
Example 10: If A and B are subsets of U and: $n(A) = 5$, $n(B') = 7$, $n(A' \cap B') = 3$. Find $n(A \cap B)$.

U

A   B
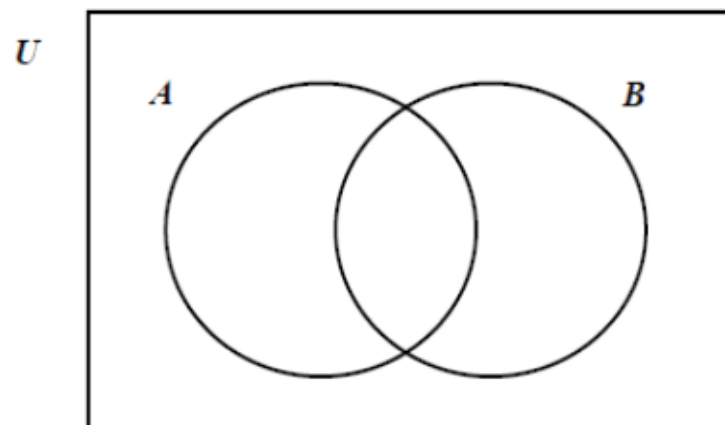
Example 11: Let *A, B,* and *C* be subsets of *U*, use the Venn diagram to shade the solution:
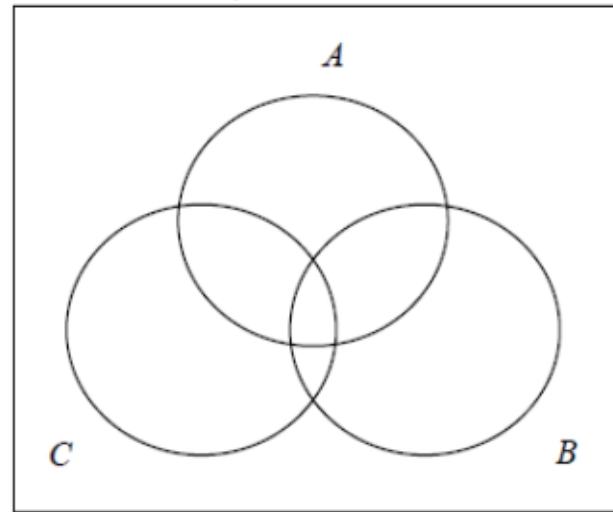
a) $A \cap B \cap C$
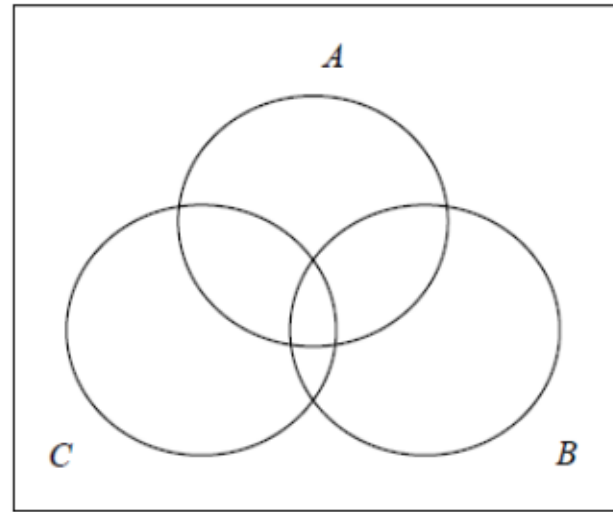
A

C   B

b) $A \cap B$

A

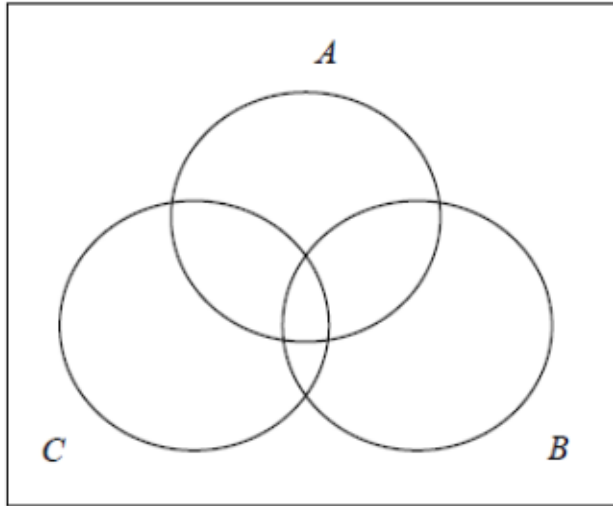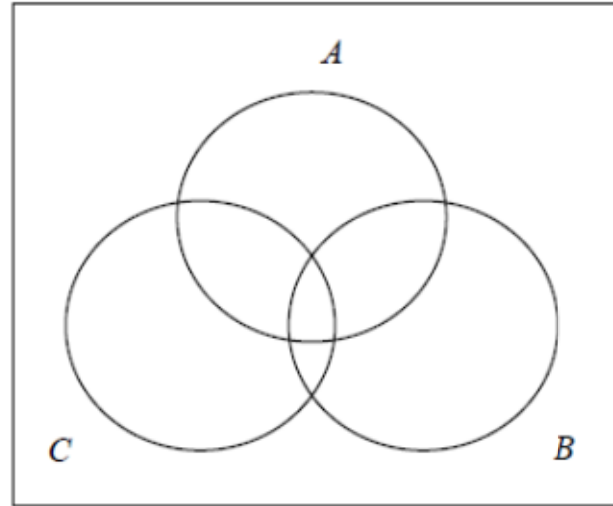C   B

c) $A \cup B$

A

C   B

d) $(A \cup B \cup C)'$

A

C   B
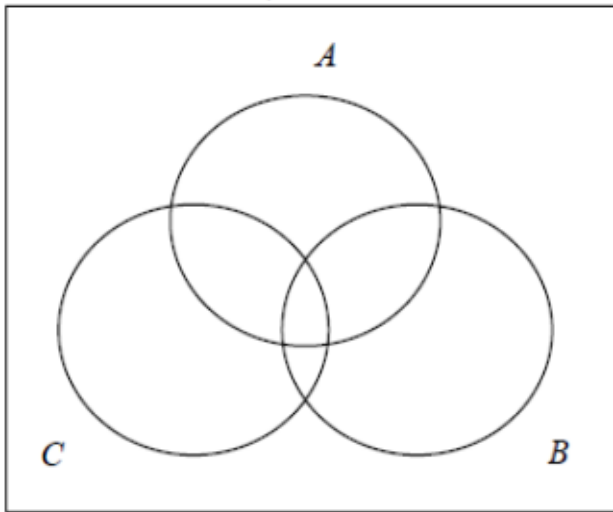
Example 11 Cont.: Let A, B, and C be subsets of U, use the Venn diagram to shade the solution:
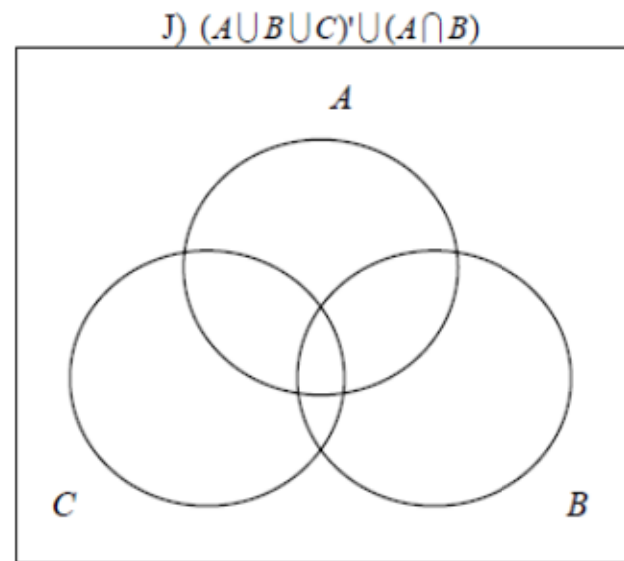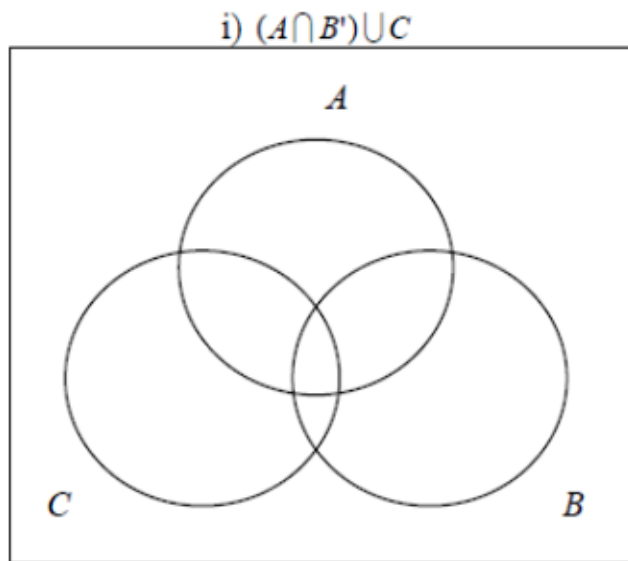
e) $A \cap B'$

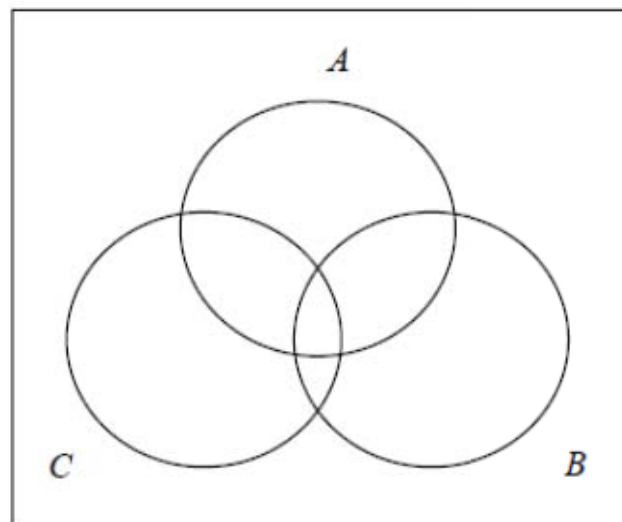f) $(A \cap B) \cap C'$

g) $(A \cup B) \cap C'$
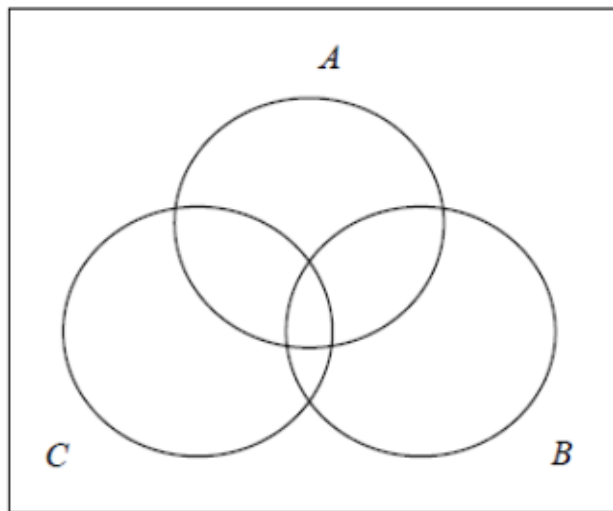
h) $A \cap (B \cap C)$
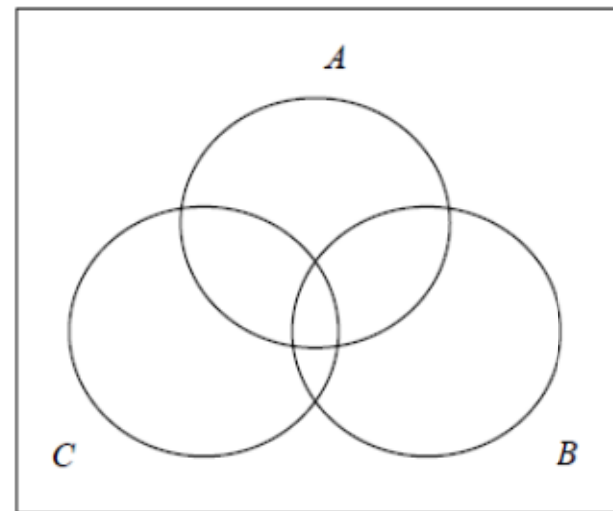
Example 11 Cont.: Let *A*, *B*, and *C* be subsets of *U*, use the Venn diagram to shade the solution:

i) $(A \cap B') \cup C$

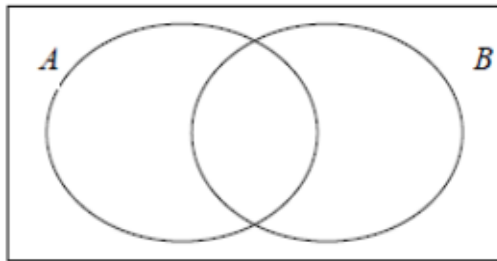J) $(A \cup B \cup C)' \cup (A \cap B)$

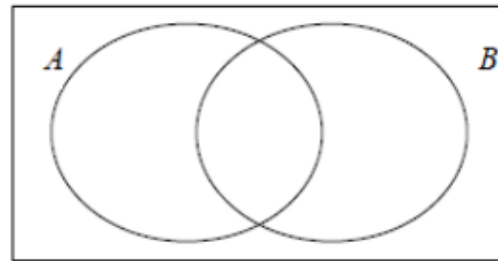

k) $(A \cup B \cup C)' \cap (A \cap B)$

Example 12: Which of the following statements is **True**?
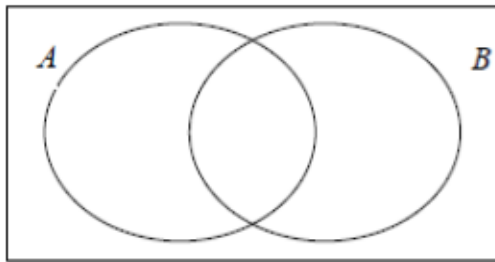
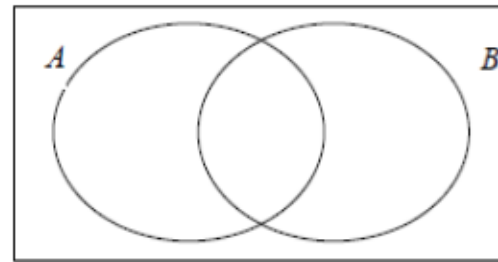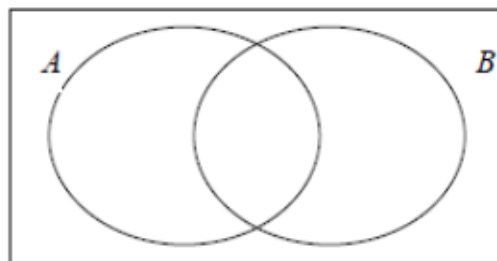a) $A' \cup B' = (A \cup B)'$

=?

b) $A' \cap B' = (A \cap B)'$

=?

c) $A \cap B' \subseteq A \cap B'$

=?