1. Suppose $A = \{1,2,3,4\}$ and $B = \{3,4,5,6\}$. What is $A \cup B$?
   A) $\{1,2,3,4,5\}$  B) $\{1,2,3,4,5,6\}$  C) $\{3,4\}$  D) $\{3,4,5,6\}$

2. Which Venn diagram below shows $C \cap D = \{\}$?
   A) ![Venn Diagram A](image1)
   B) ![Venn Diagram B](image2)
   C) ![Venn Diagram C](image3)
   D) ![Venn Diagram D](image4)

3. Let $A = \{a,b\}$, $B = \{b,c\}$ and $C = \{a,b,c\}$. Which statement below is correct?
   A) $A \cap C \subseteq B$  B) $A \cup B \subseteq C$  C) $A \cup B \subseteq C$  D) $B \cap C \subseteq A$

4. Suppose $A = \{a,b,1,2\}$ and $B = \{3,4,5,6,7\}$. Then $n(A \times B)$ is:
   A) 5  B) 9  C) 12  D) 20

5. How many regions would there be in a 3-set Venn diagram if $A \cap C = \emptyset$, $A \subset B$, and $B \cap C$ does not equal $\emptyset$?
   A) 3  B) 4  C) 5  D) 6

6. Let $A = \{10,12,14\} \cap \{11,12,13,14,15\}$. Then $A$ equals:
   A) $\{10,12,14\}$  B) $\{11,13,15\}$  C) $\{10,11,12,13,14,15\}$  D) $\{12,14\}$

7. Suppose $A$ has 11 elements, $B$ has 5 elements, and $C$ has 23 elements. What is the minimum number of elements that $A \cup B \cup C$ could have?
   A) 16  B) 21  C) 23  D) 28  E) it is impossible to tell from the given information

8. The shaded set on the Venn diagram is:
   A) $A - B$  B) $B - A$
   C) $A \cap B$  D) $B \cup A$
   E) none of the above

9. Let $A = \{5,10,15,20,25,30,35\}$ and $B = \{x|x$ is an odd number$. Find $A - B$.
   A) $\{5,15,25,35\}$  B) $\{5,10,15,20\}$  C) $\{10,20,30\}$  D) $\{25,30,35\}$  E) none of the above

10. Suppose $A \neq \{\}$ and $A \subset B$. Then $A \cap B =$
    A) $A$  B) $B$  C) $\{\}$  D) $A \cup B$  E) none of the above

11. Let $D = \{7,8,9\}$. How many subsets does $D$ have?
    A) 3  B) 4  C) 7  D) 8  E) none of the above
12. Give a verbal description of the elements of region 3 in the Venn diagram above.
A) in A and not in B   B) in A or in B   C) in B and not in A   D) in A and in B

13. Region 2 in the diagram is:
A) A – B   B) A ∩ B   C) A′ ∩ B   D) A ∪ B

14. The set A – B corresponds to what region(s)?
A) R4   B) R3   C) R2   D) R1   E) R1 and R3

15. What does (A′ ∪ B′)′ =
A) A ∩ B   B) A ∩ B′   C) A ∪ B   D) A′ ∪ B′

Information for problems 16 and 17: n(A) = 11, n(B) = 7, n(A – B) = 8.

16. How many elements are in A ∩ B?
A) 18   B) 4   C) 3   D) cannot be determined

17. How many elements are in B – A?
A) 18   B) 4   C) 3   D) cannot be determined

Information for Problems 18, 19, and 20: in a group of potential computer buyers:
- 30 people were considering buying from Gateway
- 29 were considering Dell
- 25 were considering Micron
- 13 were considering Dell and Gateway
- 12 were considering Gateway and Micron
- 10 were considering Dell and Micron
- 7 were considering all three
- 4 were considering none of these companies

NOTE: you should draw an appropriate 3-set Venn diagram.

18. How many people were considering Dell only?
A) 12   B) 11   C) 10   D) 13   E) none of the above

19. How many people were considering Gateway and Dell, but not Micron?
A) 6   B) 5   C) 4   D) 3   E) none of the above

20. How many people were considering exactly 2 of the 3 companies?
A) 13   B) 21   C) 14   D) 20   E) none of the above

21. How many people were considering exactly 1 of the 3 companies?
A) 32   B) 36   C) 30   D) 34   E) none of the above
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