Test Bank for Thinking Mathematically 7th Edition by Blitzer

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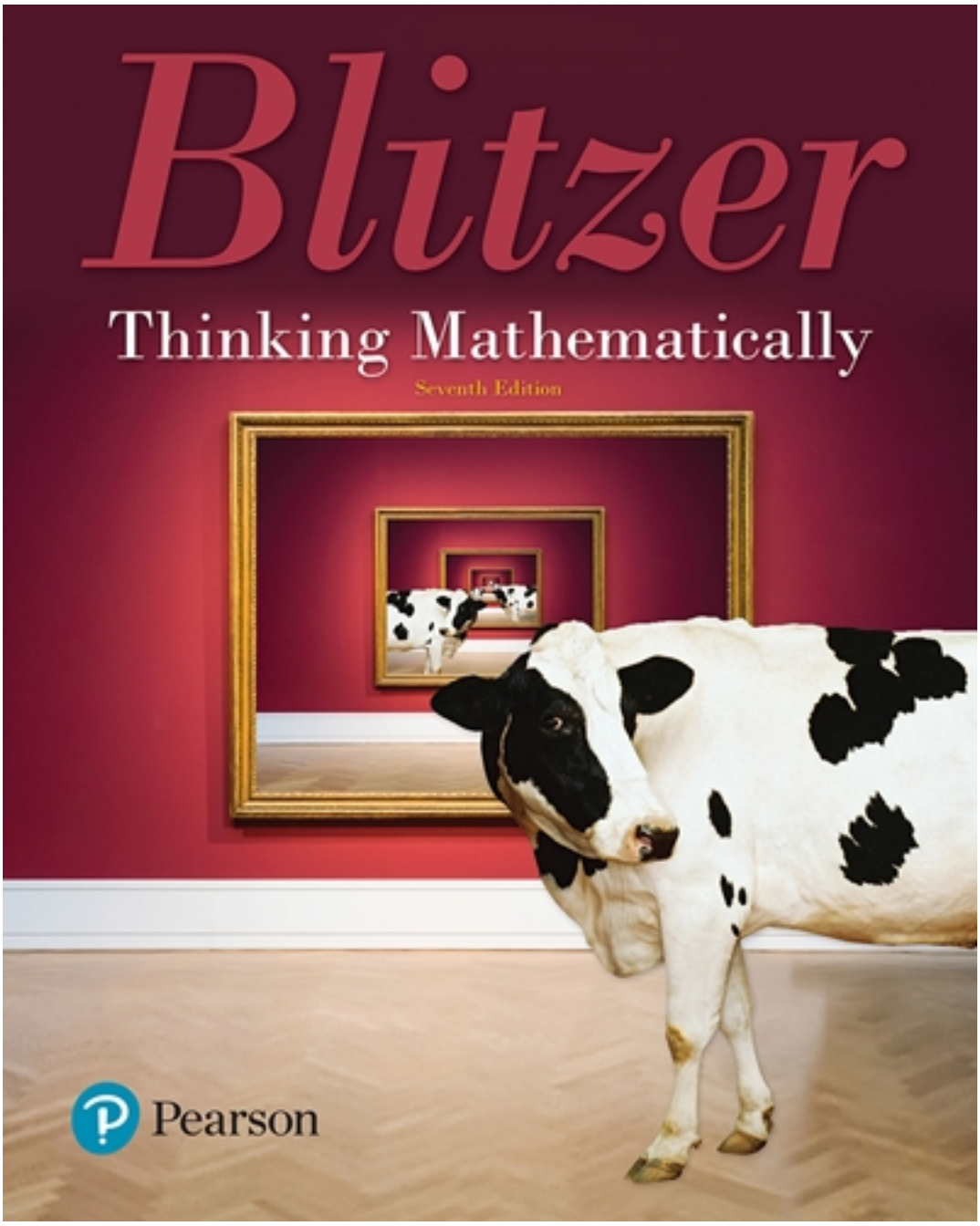


Test Bank

Ch. 2 Set Theory

2.1 Basic Set Concepts

1 Determine Whether the Collections are Well Defined or Not

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the collection is not well defined and therefore not a set.

1) The collection of frogs and toads currently in tanks at a nature center
A) well defined; set
B) not well defined; not a set

2) The collection of beautiful oil paintings currently on display at an art gallery
A) well defined; set
B) not well defined; not a set

2 Use Three Methods to Represent Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write a word description of the set.

1) {January, February, March, April, May, June, July, August, September, October, November, December}
A) months of the year
B) days of the year
C) days of the week
D) seasons of the year

2) {40, 42, 44, 46, ..., 100}
A) even numbers from 40 to 100
B) all even numbers
C) numbers from 40 to 100
D) odd numbers from 40 to 100

3) {March, May}
A) the set of months that begin with M
B) the set of months in the year
C) the set of months that are warm
D) the set of months in the Spring

4) {10, 11, 12, 13, ...}
A) the set of natural numbers greater than 9
B) the set of natural numbers
C) the set of natural numbers less than 14
D) the set of two-digit natural numbers

3 Use Roster Method

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Express the set using the roster method.

1) the set of natural numbers less than or equal to 9
A) {1, 2, 3, . . . , 9}
B) {0, 1, 2, 3, . . . , 9}
C) {0, 1, 2, 3, . . . , 8}
D) {1, 2, 3, . . . , 8}

2) the set of odd natural numbers less than 21
A) {1, 3, 5, . . . , 19}
B) {1, 3, 5, . . . , 21}
C) {2, 4, 6, . . . , 20}
D) {0, 1, 3, 5, . . . , 19}

3) {x | x ∈ N and x is greater than 9}
A) {10,11,12,...}
B) {9,10,11,...}
C) {10,11,12}
D) {10,12,14,...}

4) {x | x ∈ N and x lies between 5 and 9}
A) {6, 7, 8}
B) {5, 6, 7, 8, 9}
C) {5, 6, 7, 8}
D) {6, 7, 8, 9}

List the elements in the set.

5) The set of the days of the week
   A) {Friday, Monday, Saturday, Sunday, Thursday, Tuesday, Wednesday}
   B) {Saturday, Sunday}
   C) {Tuesday, Thursday}
   D) {Sunday, Monday, Tuesday, Wednesday, Thursday, Friday, Sunday}

4 Define and Recognize the Empty Set

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine if the set is the empty set.

1) {0, ∅}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

2) {x | x is a living U.S. president born after 1700}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

3) {x | x is the number of living U.S presidents born before 1700}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

4) {x | x is a day of the week whose name begins with the letter Y}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

5) {x | x < 10 and x > 14}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

6) {x | x ∈ N and 2 < x < 6}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

7) {x | x is a number less than 4 or greater than 8}
   A) Yes, it is the empty set.
   B) No, it is not the empty set.

5 Use the Symbols ∈ and ∉

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the statement is true or false.

1) 9 ∈ {1, 3, 5, 7, 9}
   A) True
   B) False

2) 5 ∈ {1, 2, 3, ..., 15}
   A) True
   B) False

3) 17 ∈ {2, 4, 6, ..., 20}
   A) True
   B) False

4) 16 ∉ {1, 2, 3, ..., 10}
   A) True
   B) False

5) 33 ∉ {1, 2, 3, ..., 40}
   A) True
   B) False

6) $3 \notin \{x \mid x \in N \text{ and } x \text{ is odd}\}$
A) True B) False

7) $22 \notin \{x \mid x \in N \text{ and } 15 < x \leq 25\}$
A) True B) False

8) $-5 \notin N$
A) True B) False

6 Find the Cardinal Number for Each Set

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Find the cardinal number for the set.

1) {27, 29, 31, 33, 35}
A) 5 B) 6 C) 4 D) 27

2) {8, 10, 12, . . . , 66}
A) 30 B) 20 C) 60 D) 15

3) {x | x is a day of the week that begins with the letter N}
A) 0 B) 2 C) 1 D) 3

4) Determine the cardinal number of the set {x | x is a letter of the alphabet}
A) 26 B) 25 C) 23 D) 30

5) D = {seven}
A) 1 B) 0 C) 5 D) 7

6) $B = \{x \mid x \in N \text{ and } 1 \leq x < 9\}$
A) 8 B) 9 C) 7 D) 10

7) $C = \{x \mid x \leq 4 \text{ and } x \geq 12\}$
A) 0 B) 9 C) 8 D) 16

7 Recognize Equivalent Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Are the sets equivalent?

1) A is the set of residents age 54 or older living in the United States
B is the set of residents age 54 or older registered to vote in the United States
A) Yes B) No

2) A = {19, 20, 21, 22, 23}
B = {18, 19, 20, 21, 22}
A) Yes B) No

3) A = {31, 33, 35, 37, 39}
B = {32, 34, 36, 38, 40}
A) Yes B) No

4) A = {18, 19, 19, 20, 20, 20, 21, 21, 21, 21}
B = {21, 20, 19, 18}
A) Yes B) No

5) A = {Larry, Moe, Curly. Shemp}
B = {Posh, Sporty, Baby, Scary}
A) Yes B) No

8 Recognize Equal Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Are the sets equal?

1) {e, f, g, h} = {f, h, g, e}
A) Yes B) No

2) {12, 14, 16, 18, 20} = {14, 16, 18, 20}
A) Yes B) No

3) {5, 5, 13, 13, 15} = {5, 13, 15}
A) Yes B) No

4) A is the set of residents age 31 or older living in the United States
B is the set of residents age 31 or older registered to vote in the United States
A) Yes B) No

5) A = {9, 10, 11, 12, 13}
B = {8, 9, 10, 11, 12}
A) Yes B) No

6) A = {31, 33, 35, 37, 39}
B = {32, 34, 36, 38, 40}
A) Yes B) No

7) A = {17, 18, 18, 19, 19, 19, 20, 20, 20, 20}
B = {20, 19, 18, 17}
A) Yes B) No

9 Distinguish Between Finite and Infinite sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the set is finite or infinite.

1) $\{x \mid x \in N \text{ and } x \geq 1000\}$
A) Finite B) Infinite

2) $\{x \mid x \in N \text{ and } x \leq 100\}$
A) Finite B) Infinite

3) The set of natural numbers less than 100
A) Finite B) Infinite

4) The set of natural numbers less than 1
A) Finite B) Infinite

10 Apply Set Notation to Sets of Natural Numbers

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Express the set using set-builder notation. Use inequality notation to express the condition x must meet in order to be a member of the set.

1) A = {12, 13, 14, 15, 16,...}

A) {x | x ∈ N and x ≥ 12}
B) {x | x ∈ N and x > 12}
C) {x | x ∈ N and x ≥ 16}
D) {x | x ∈ N and x ≤ 12}

2) A = {400, 401, 402, . . ., 4000}

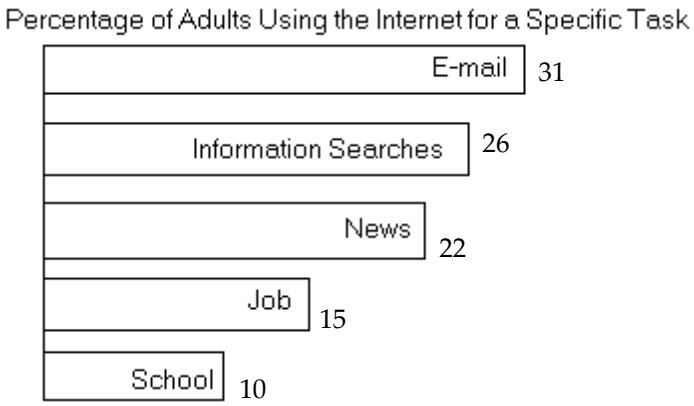
A) {x | x ∈ N and 400 ≤ x ≤ 4000}
B) {x | x ∈ N and x ≤ 4000}
C) {x | 400 < x < 4000}
D) {x | x ∈ N and x ≥ 400 }

11 Solve Applications

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The bar graph shows the percentage of adults that use the Internet for specific tasks. Use the graph to represent the given set using the roster method.

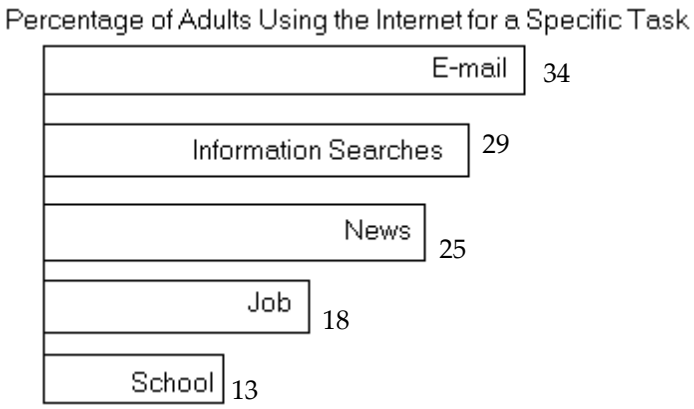
1)



the set of tasks in which usage exceeds 20%

A) {e-mail, information searches, news}
B) {e-mail, information searches}
C) {e-mail, information searches, news, job}
D) {job, school}

2)

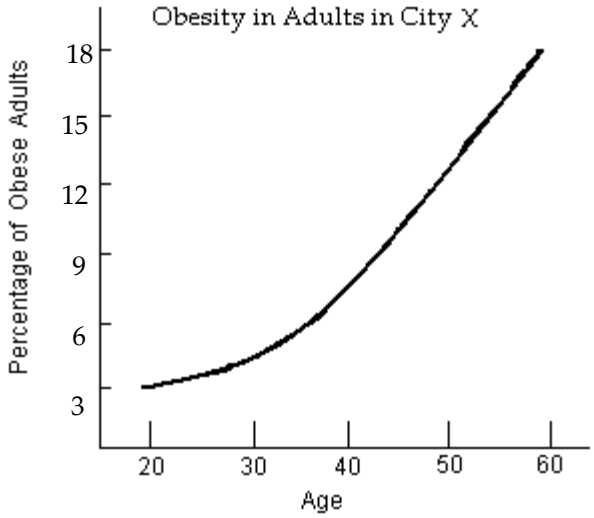


{x | x is a task in which usage lies between 15% and 33%}

A) {information searches, news, job}
B) {email, information searches, news, job, school}
C) {news}
D) {news, job}

The line graph shows the percentage of obese adults in a certain city by age. Based on the information in the graph, represent the set using the roster method.

3)



{x | x is an age at which 12% of adults in city X are obese}

A) {50} B) {40} C) {30} D) {60}

2.2 Subsets

1 Recognize Subsets and Use the Notation $\subset, \subseteq$

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Write $\subseteq$ or $\not\subseteq$ in the blank so that the resulting statement is true.

1) {3, 5, 7} __ {2, 3, 4, 5, 7}

A) $\subseteq$ B) $\not\subseteq$

2) {13, 30, 35} __ {17, 30, 35, 45}
A) $\subseteq$ B) $\not\subseteq$

3) {red, blue, green} _____ {blue, green, yellow, black}
A) $\subseteq$ B) $\not\subseteq$

4) {x | x is a tree} _____ {x | x is a spruce tree}
A) $\subseteq$ B) $\not\subseteq$

5) {c, a, n, d, i, d, a, t, e} _____ {a, c, d, e, i, t, a, n, d}
A) $\subseteq$ B) $\not\subseteq$

6) $\left\{\frac{8}{11}, \frac{3}{7}\right\}$ _____ $\left\{\frac{11}{8}, \frac{7}{3}\right\}$
A) $\subseteq$ B) $\not\subseteq$

Use $\subseteq$, $\not\subseteq$, $\subset$, or both $\subset$ and $\subseteq$ to make a true statement.

7) {a, b} __ {z, a, y, b, x, c}
A) $\subset$ and $\subseteq$ B) $\subset$ C) $\subseteq$ D) $\not\subseteq$

8) {13, 14, 15} __ {13, 14, 15}
A) $\subseteq$ B) $\subset$ C) $\subset$ and $\not\subseteq$ D) $\not\subseteq$

9) {x | x is a male who is registered with Selective Service} _____ {x | x is a male who is in the Army}
A) $\not\subseteq$ B) $\subseteq$ C) $\subseteq$ and $\subset$ D) $\subset$

2 Determine Whether Each Statement is True or False

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Determine whether the statement is true or false.

1) Ted $\subseteq$ {Bob, Carol, Ted, Alice}
A) True B) False

2) {Ted} $\subseteq$ {Bob, Carol, Ted, Alice}
A) True B) False

3) $\emptyset \subseteq$ {France, Germany, Switzerland}
A) True B) False

4) {2, 9} $\not\subseteq$ {9, 2}
A) True B) False

5) {1} $\not\subseteq$ $\emptyset$
A) True B) False

3 Determine the Number of Subsets of a Set

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

List all the subsets of the given set.

1) {Siamese, domestic shorthair}
A) {Siamese, domestic shorthair}, {Siamese}, {domestic shorthair}, { }
B) {Siamese}, {domestic shorthair}, { }
C) {Siamese, domestic shorthair}, {Siamese}, {domestic shorthair},
D) {Siamese, domestic shorthair}, {domestic shorthair}, { }

2) {9}
A) {9}, { } B) {9} C) { } D) {0}, {9}, { }

3) ∅
A) ∅ B) no subsets C) {∅} D) { }, {0}

Calculate the number of subsets and the number of proper subsets for the set.

4) $\left\{\frac{1}{6}, \frac{1}{7}, \frac{1}{8}, \frac{1}{9}\right\}$
A) 16; 15 B) 15; 16 C) 15; 14 D) 14; 15

5) {1, 3, 5, 7, 9, 11}
A) 64; 63 B) 63; 64 C) 63; 62 D) 62; 63

6) the set of natural numbers less than 10
A) 512; 511 B) 511; 512 C) 511; 510 D) 510; 511

7) the set of words describing the colors on a stoplight
A) 8; 7 B) 7; 8 C) 16; 15 D) 15; 16

8) {x | x is a day of the week}
A) 128; 127 B) 127; 126 C) 128; 129 D) 64; 65

4 Apply Concepts of Subsets and Equivalent Sets to Infinite Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Provide an appropriate response.

1) If set A is equivalent to the set of natural numbers, then $n(A) < \aleph_0$.
A) True B) False

2) If set A is equivalent to the set of odd natural numbers, then $n(A) = \aleph_0$.
A) True B) False

3) The set {1, 2, 3, ..., 100} has 2^{100} proper subsets.
A) True B) False

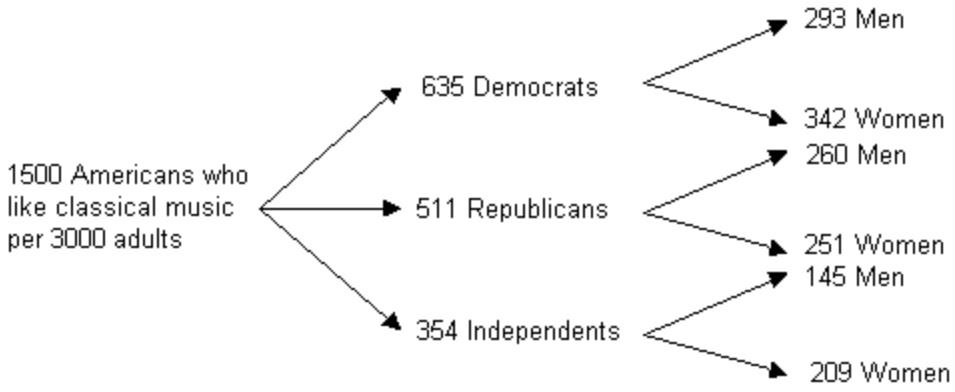
4) $\{x \mid x \in N \text{ and } 45 < x < 70\} \subseteq \{x \mid x \in N \text{ and } 45 \leq x \leq 70\}$
A) True B) False

5) $\emptyset \not\subseteq \{\emptyset\}$
A) True B) False

5 Solve Applications

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Consider below the branching tree diagram based on the number per 3000 American adults.



Let T = the set of Americans who like classical music
R = the set of Republicans who like classical music
D = the set of Democrats who like classical music
I = the set of Independents who like classical music

Determine whether the statement is true or false.

1) $R \in T$
A) True B) False

2) $R \subset T$
A) True B) False

3) Let M = the set of Democratic men who like classical music
W = the set of Democratic women who like classical music
$M \subset T$
A) True B) False

4) Let M = the set of Democratic men who like classical music
W = the set of Democratic women who like classical music
If $x \in D$, then $x \in W$.
A) True B) False

5) Let M = the set of Republican men who like classical music
W = the set of Republican women who like classical music
If $x \in W$, then $x \in R$.
A) True B) False

6) If $x \in D$, then $x \notin R$.
A) True B) False

7) Let M = the set of Independent men who like classical music
W = the set of Independent women who like classical music
The set of elements in M and W combined is equal to set I.
A) True B) False

Use the formula for the number of subsets of a set with n elements to solve the problem.

8) Pasta comes with tomato sauce and can be ordered with some, all, or none of these ingredients in the sauce: {onions, garlic, carrots, broccoli, shrimp, mushrooms, zucchini, green pepper}. How many different variations are available for ordering pasta with tomato sauce?
A) 256 B) 128 C) 255 D) 127

9) A village has 4 fire engines. If a radio dispatcher receives a call, depending on the nature of the situation, no engines, one engine, two engines, three engines, or all four engines can be sent to a fire. How many options does the dispatcher have for sending the fire engines to the scene of the caller?
A) 16 B) 8 C) 15 D) 7

2.3 Venn Diagrams and Set Operations

1 Understand the Meaning of a Universal Set

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

Describe a universal set U that includes all elements in the given sets. Answers may vary.

1) A = {Copeland, Gershwin, Bernstein}
B = {Strauss, Mendlssohn}

2) A = {fruit juice, coffee}
B = {tea, spring water}

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Let U = {1, 2, 4, 5, a, b, c, d, e}. Use the roster method to write the complement of the set.

3) Q = {2, 4, b, d}
A) {1, 5, a, c, e}
B) {1, 3, 5, a, c, e}
C) {1, 5, a, e}
D) {1, 2, 4, 5, a, b, c, d, e}

Let U = {21, 22, 23, ..., 40}, A = {21, 22, 23, 24, 25}, B = {26, 27, 28, 29}, C = {21, 23, 25, 27, ..., 39}, and D = {22, 24, 26, 28, ..., 40}. Use the roster method to write the following set.

4) A'
A) A' = {26, 27, 28, . . . , 40}
B) A' = {26, 28, 30, . . . , 40}
C) A' = {27, 29, 31, . . . , 39}
D) A' = {21, 22, 23, . . . , 40}

Let U = {21, 22, 23, 24, ...}, A = {21, 22, 23, 24, ..., 40}, B = {21, 22, 23, 24, ..., 50}, C = {22, 24, 26, 28, ...}, and D = {21, 23, 25, 27, ...}. Use the roster method to write the following set.

5) C'
A) C' = {21, 23, 25, 27, ...}
B) C' = {22, 24, 26, 28, ...}
C) C' = {21, 22, 23, 24, ...}
D) C' = {21, 23, 25, 27, ..., 39}

2 Perform Operations with Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the 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) $(A \cup B)'$
A) {r, t, v, x}
B) {r, s, t, u, v, w, x, z}
C) {t, v, x}
D) {s, u, w}

2) A' ∪ B
A) {q, r, s, t, v, x, y, z}
B) {s, u, w}
C) {q, s, t, u, v, w, x, y}
D) {r, s, t, u, v, w, x, z}

3) C' ∪ A'
A) {q, r, s, t, u, v, x, z}
B) {s, t}
C) {w, y}
D) {q, s, u, v, w, x, y, z}

4) B ∪ C
A) {q, s, v, w, x, y, z}
B) {v, w, x, y, z}
C) {q, s, u, w, y}
D) {q, r, s, t, u, v, w, x, y, z}

5) C ∪ ∅
A) {v, w, x, y, z}
B) { }
C) {q, s, u, w, y}
D) {q, s, y, z}

6) B ∪ U
A) {q, r, s, t, u, v, w, x, y, z}
B) {q, s, y, z}
C) {q, s, u, w, y}
D) {v, w, x, y, z}

7) A ∩ B'
A) {u, w}
B) {q, s, t, u, v, w, x, y}
C) {r, s, t, u, v, w, x, z}
D) {t, v, x}

8) (A ∪ B)'
A) {r, t, v, x}
B) {r, s, t, u, v, w, x, z}
C) {t, v, x}
D) {s, u, w}

9) (A ∩ B)'
A) {r, t, u, v, w, x, z}
B) {t, v, x}
C) {s, u, w}
D) {q, s, t, u, v, w, x, y}

10) A' ∪ B
A) {q, r, s, t, v, x, y, z}
B) {s, u, w}
C) {q, s, t, u, v, w, x, y}
D) {r, s, t, u, v, w, x, z}

11) C' ∪ A'
A) {q, r, s, t, u, v, x, z}
B) {s, t}
C) {w, y}
D) {q, s, u, v, w, x, y, z}

12) C' ∩ A'
A) {r, t}
B) {q, r, s, t, u, v, x, z}
C) {w, y}
D) {q, s, u, v, w, x, y, z}

13) A ∩ B
A) {q, s, y}
B) {r, t, u, v, w, x, z}
C) {q, s, u, w, y, z}
D) {v, w, x, y, z}

14) B ∪ C
A) {q, s, v, w, x, y, z}
B) {v, w, x, y, z}
C) {q, s, u, w, y}
D) {q, r, s, t, u, v, w, x, y, z}

15) A'
A) {r, t, v, x, z}
B) {q, s, y, z}
C) {q, r, s, t, u, v, w, x, y, z}
D) {s, u, w, y}

16) $(A \cap C)'$

A) {q, r, s, t, u, v, x, z}
B) {w, y}
C) {q, r, s, t, u, v, w, x, y, z}
D) {q, s, y, z}

17) $C \cup \varnothing$

A) {v, w, x, y, z}
B) { }
C) {q, s, u, w, y}
D) {q, s, y, z}

18) $B \cup U$

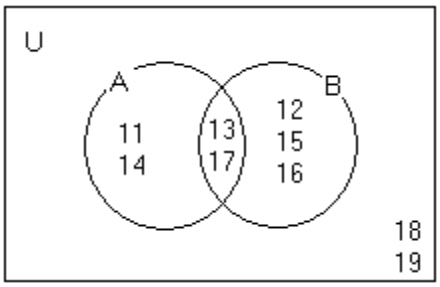
A) {q, r, s, t, u, v, w, x, y, z}
B) {q, s, y, z}
C) {q, s, u, w, y}
D) {v, w, x, y, z}

3 Use Venn Diagrams to Visualize Relationships Between Two Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

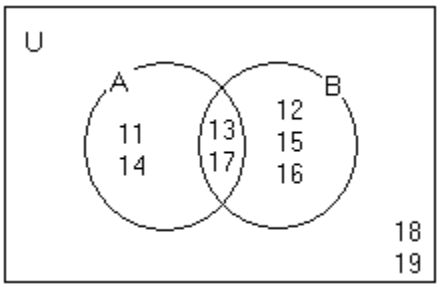
Use the Venn diagram to determine the set or cardinality.

1) A



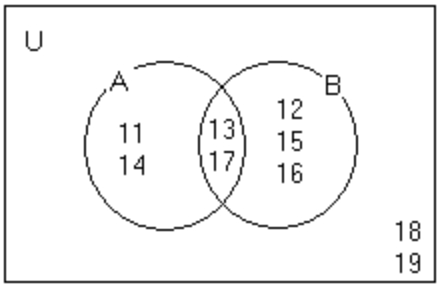
A) {11, 13, 14, 17}
B) {13, 17}
C) {12, 15, 16}
D) {11, 12, 13}

2) B



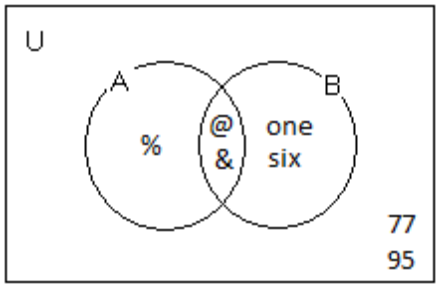
A) {12, 13, 15, 16, 17}
B) {11, 14}
C) {13, 17}
D) {14, 16, 17}

3) U



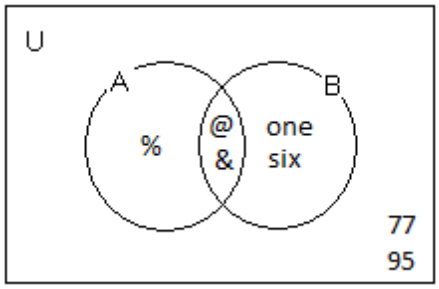
A) {11, 12, 13, 14, 15, 16, 17, 18, 19}
B) {11, 14}
C) {12, 15, 16}
D) {13, 17}

4) A ∩ B



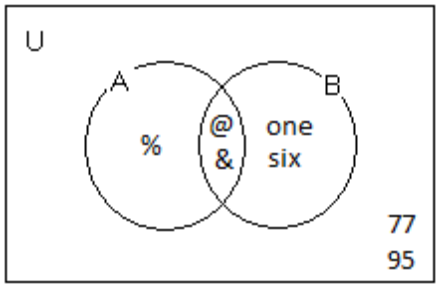
A) {@, &} B) {%, @, &, one, six} C) {77, 95} D) {%, one, six}

5) n(A ∪ B)



A) 5 B) 2 C) {@, &} D) {%, @, &, one, six}

6) n(∪) – n(B)



A) 3 B) {%, @, &, 77, 95} C) 4 D) {%, 77, 95}

4 Use the Formula for n(A ∪ B)

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the formula for the cardinal number of the union of two sets to solve the problem.

1) Set A contains 4 elements, set B contains 9 elements, and 2 elements are common to sets A and B. How many elements are in A ∪ B?
A) 11 B) 10 C) 12 D) 13

2) Set A contains 11 letters and 9 numbers. Set B contains 8 letters and 11 numbers. Five letters and 3 numbers are common to both sets A and B. Find the number of elements in set A or set B.
A) 31 B) 47 C) 39 D) 28

3) Set A contains 35 elements and set B contains 22 elements. If there are 40 elements in (A ∪ B) then how many elements are in (A ∩ B)?
A) 17 B) 5 C) 8 D) 13

5 Find Each of the Given Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

In the exercise below, let
U = {x | x ∈ N and x < 10}
A = {x | x is an odd natural number and x < 10}
B = {x | x is an even natural number and x < 10}
C = {x | x ∈ N and 3 < x < 5}

Find the set.

1) A ∪ B
A) U or {1, 2, 3, 4, 5, 6, 7, 8, 9}
B) B or {2, 4, 6, 8}
C) {1, 3, 5, 7, 9}
D) U or {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

2) B ∩ U
A) B or {2, 4, 6, 8}
B) U or {1, 2, 3, 4, 5, 6, 7, 8, 9}
C) B or {2, 4, 6, 8, 10}
D) U or {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

3) B ∩ C'
A) {2, 6, 8}
B) B or {2, 4, 6, 8}
C) B or {2, 4, 6, 8, 10}
D) C or {4}

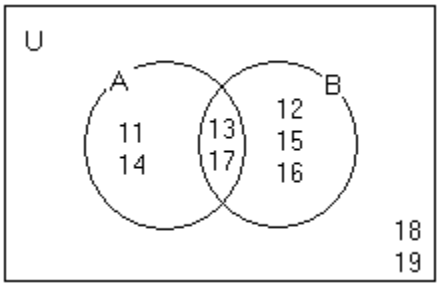
4) (A ∩ C)'
A) U or {1, 2, 3, 4, 5, 6, 7, 8, 9}
B) {1, 2, 3, 5, 6, 7, 8, 9}
C) U or {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}
D) {1, 3, 4, 5, 7, 9}

6 Determine Sets Involving Set Operations from a Venn Diagram

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

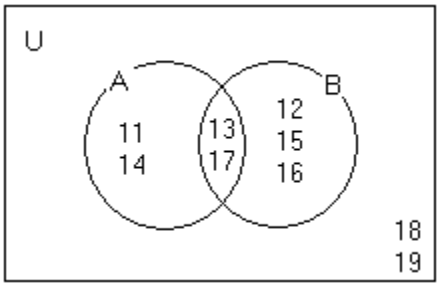
Use the Venn diagram to list the elements of the set in roster form.

1)



A ∪ B
A) {11, 12, 13, 14, 15, 16, 17}
B) {13, 17}
C) {11, 12, 14, 15, 16}
D) {11, 12, 13, 14, 15, 16, 17, 18, 19}

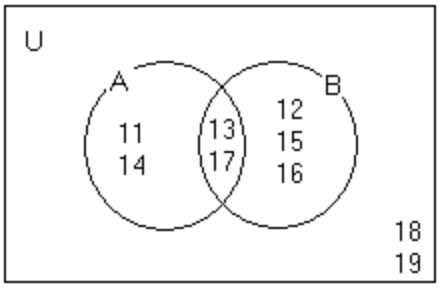
2)



$A \cap B$

A) {13, 17}
B) {11, 12, 13, 14, 15, 16, 17}
C) {11, 12, 13, 14, 15, 16, 17, 18, 19}
D) {11, 12, 14, 15, 16}

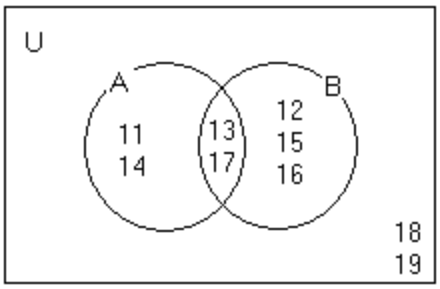
3)



A'

A) {12, 15, 16, 18, 19}
B) {11, 14, 18, 19}
C) {12, 15, 16}
D) {11, 13, 14, 17}

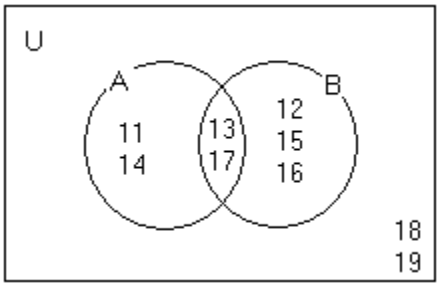
4)



B'

A) {11, 14, 18, 19}
B) {12, 15, 16, 18, 19}
C) {11, 14}
D) {11, 13, 14, 17, 18, 19}

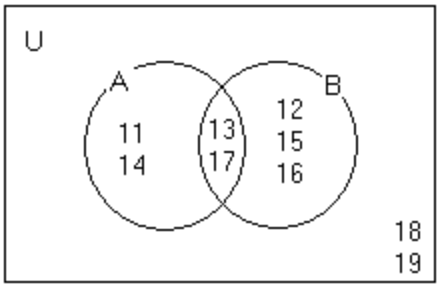
5)



$(A \cap B)'$

A) {11, 12, 14, 15, 16, 18, 19}
B) {13, 17}
C) {18, 19}
D) {11, 12, 14, 15, 16}

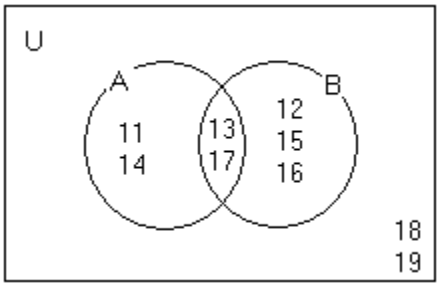
6)



$(A \cup B)'$

A) {18, 19}
B) {11, 12, 13, 14, 15, 16, 17}
C) {11, 12, 14, 15, 16}
D) {13, 17}

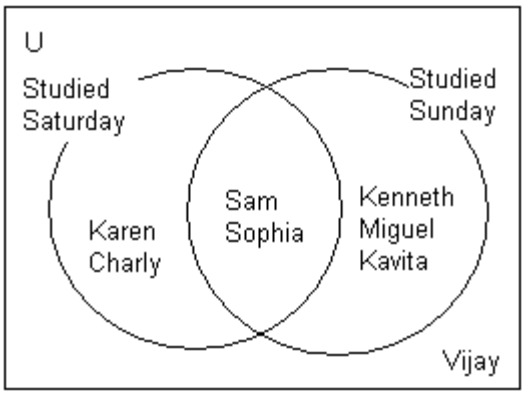
7)



$A' \cap B$

A) {12, 15, 16}
B) {11, 13, 14, 17, 18, 19}
C) {11, 14}
D) {12, 15, 16, 18, 19}

Use the Venn diagram to list the elements of the set in roster form.



8) The set of students who studied Saturday
A) {Karen, Charly, Sam, Sophia}
B) {Karen, Charly}
C) {Sam, Sophia}
D) {Karen, Charly, Vijay}

9) The set of students who studied Saturday and Sunday
A) {Sam, Sophia}
B) {Karen, Charly, Kenneth, Miguel, Kavita}
C) {Karen, Charly, Kenneth, Miguel, Kavita, Sam, Sophia}
D) {Sam, Sophia, Vijay}

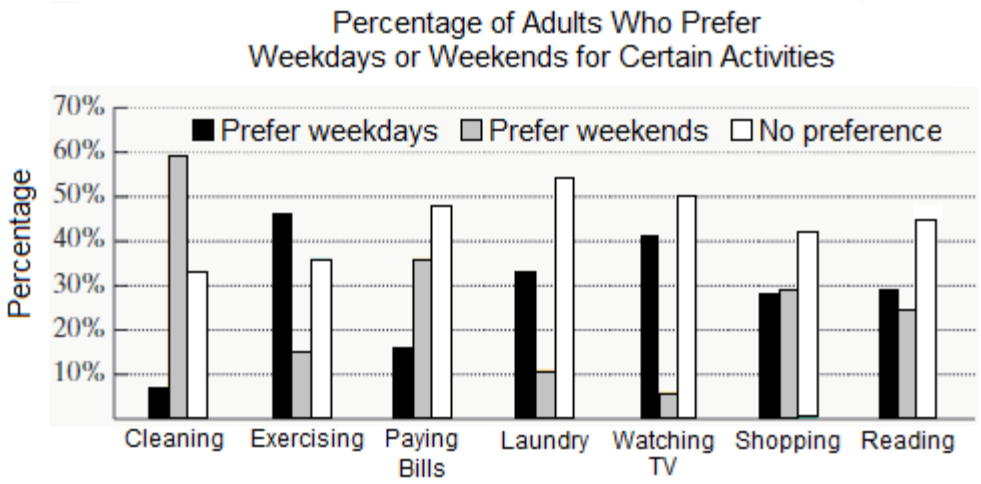
10) The set of students who studied Saturday and not Sunday
A) {Karen, Charly}
B) {Kenneth, Miguel, Kavita}
C) {Sam, Sophia}
D) {Karen, Charly, Vijay}

11) The set of students who studied neither Saturday nor Sunday
A) {Vijay}
B) {}
C) {U, Vijay}
D) {Vijay, Karen, Charly}

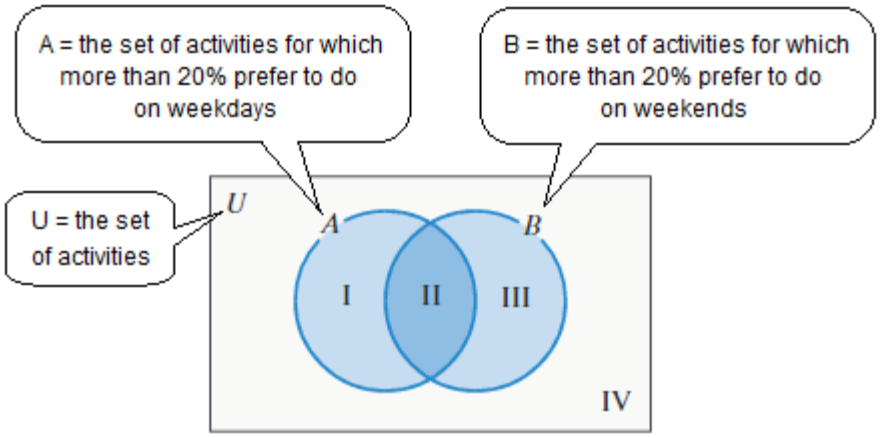
7 Solve Applications

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

The bar graph shows the percentage of adults that prefer to do certain activities during the weekdays or weekends.



Use the information in the graph to place the indicated activity in the correct region of the Venn diagram below.



1) Cleaning
A) III B) I C) II D) IV

2) Exercising
A) I B) III C) II D) IV

3) Shopping
A) II B) III C) I D) IV

4) Reading
A) II B) III C) I D) IV

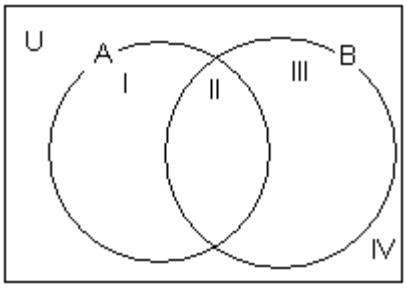
8 Understanding Palindromic Number

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

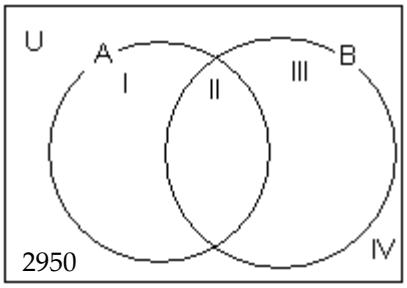
Use the following definition to place the indicated natural number in the correct region of the Venn diagram.

A palindromic number is a natural number whose value does not change if its digits are reversed.
U = the set of natural numbers
A = the set of palindromic numbers
B = the set of odd numbers

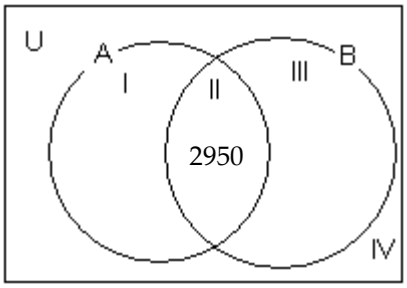
1) 2950



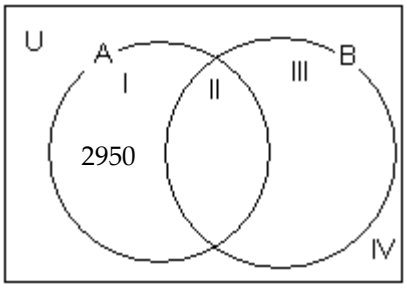
A)



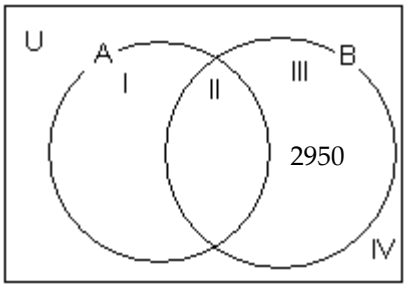
B)



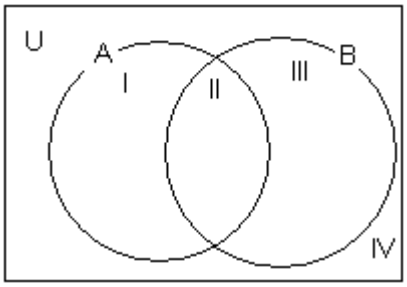
C)



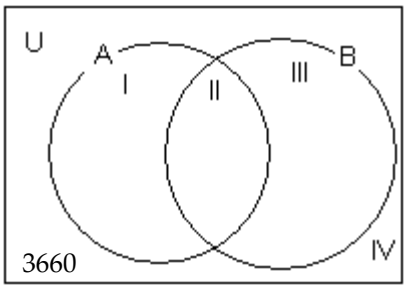
D)



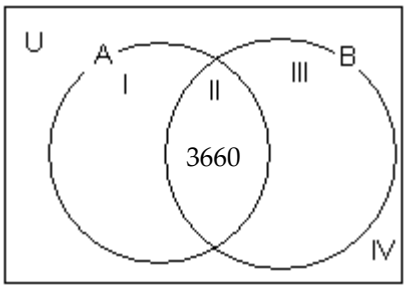
2) 3660



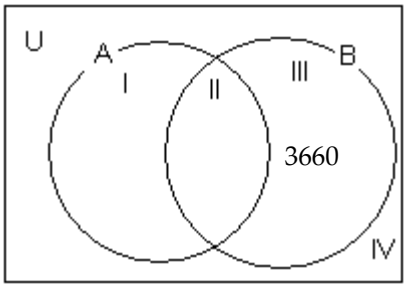
A)



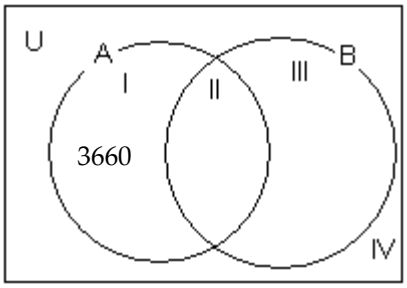
B)



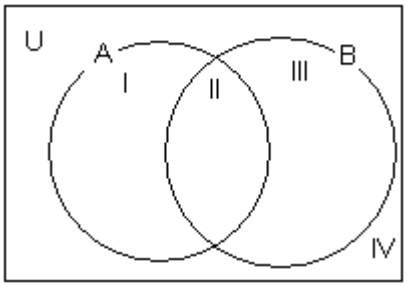
C)



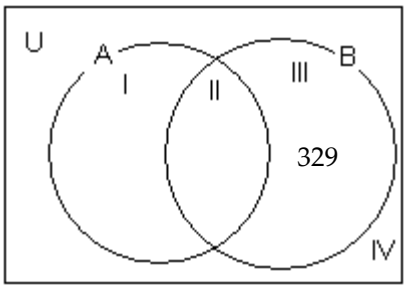
D)



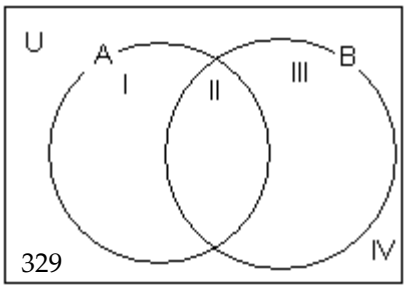
3) 329



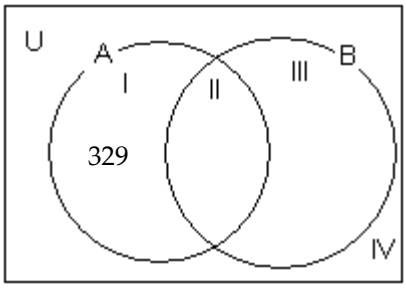
A)



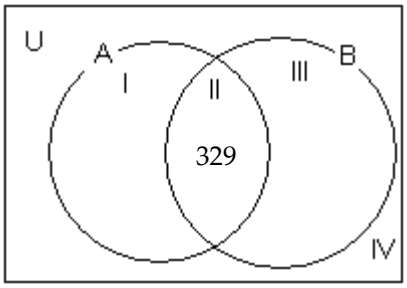
B)



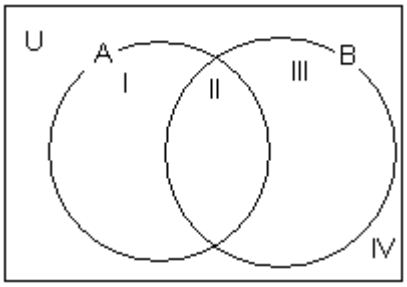
C)



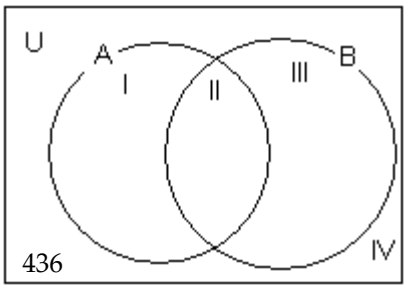
D)



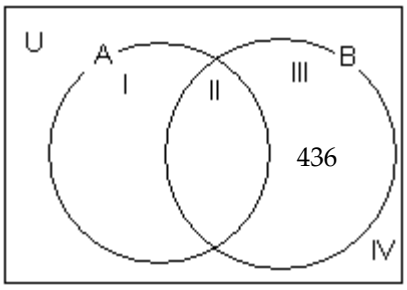
4) 436



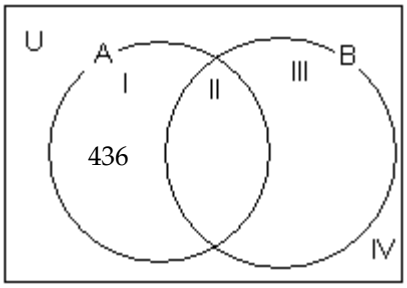
A)



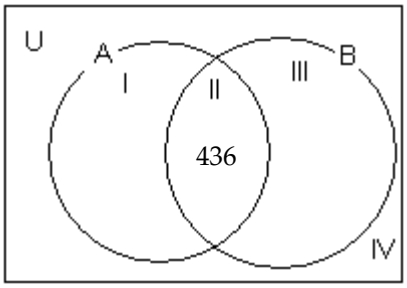
B)



C)



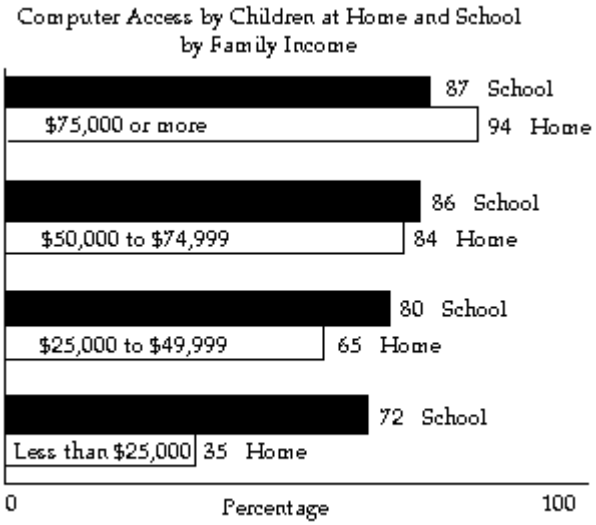
D)



9 Solve Apps: Venn Diagram

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Many children do not have access to computers at home. School has an equalizing effect. Family income is a strong factor in access. Use the information in the graph to write the set in the exercise in roster form or express the set as ∅.



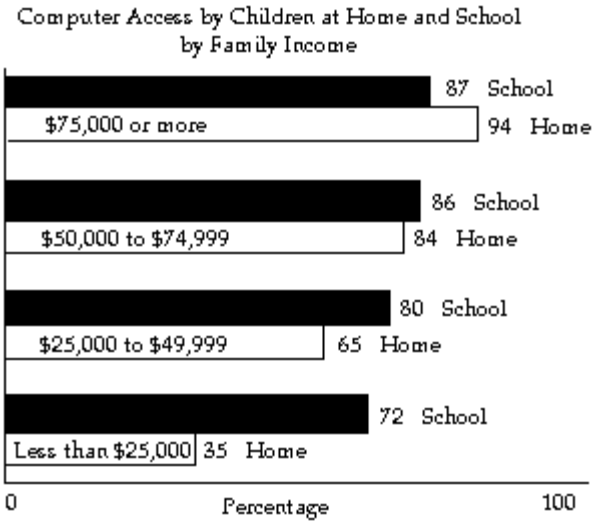
1) {x | x is home access by more than 34% of the students} ∩ {x | x is school access by less than 73% of the students}
   A) {Less than $25,000}
   B) {$25,000 to $49,999}
   C) {$50,000 to $74,999}
   D) {$75,000 or more}

2) the set of home access by more than 80% of the students and school access by less than 70% of the students}
   A) {$50,000 to $74,999, $75,000 or more}
   B) {Less than $25,000}
   C) {$50,000 to $74,999}
   D) ∅

Solve the problem.

3) Let U = the set of the days of the week, A = {Monday, Tuesday, Wednesday, Thursday, Friday} and B = {Friday, Saturday, Sunday}. Find (A ∩ B)'.
   A) {Monday, Tuesday, Wednesday, Thursday, Saturday, Sunday}
   B) {Friday}
   C) {Saturday, Sunday}
   D) ∅

Many children do not have access to computers at home. School has an equalizing effect. Family income is a strong factor in access. Use the information in the graph to write the set in the exercise in roster form or express the set as ∅.



4) {x | x is home access by more than 34% of the students} ∪ {x | x is school access by less than 81% of the students}
   A) {Less than $25,000, $25,000 to $49,999}
   B) {$25,000 to $49,999, $50,000 to $74,999}
   C) {$50,000 to $74,999, $75,000 or more}
   D) {Less than $25,000, $75,000 or more}

5) the set of home access by more than 80% of the students or school access by less than 87% of the students}
   A) {$50,000 to $74,999, $75,000 or more}
   B) {Less than $25,000, $25,000 to $49,999}
   C) {Less than $25,000, $25,000 to $49,999, $50,000 to $74,999}
   D) {$25,000 to $49,999, $50,000 to $74,999, $75,000 or more}

Use sets to solve the problem.

6) Results of a survey of fifty students indicate that 30 like red jelly beans, 29 like green jelly beans, and 17 like both red and green jelly beans. How many of the students surveyed like only red jelly beans?
   A) 13 B) 30 C) 17 D) 12

7) Mrs. Bollo's second grade class of thirty students conducted a pet ownership survey. Results of the survey indicate that 8 students own a cat, 15 students own a dog, and 5 students own both a cat and a dog. How many of the students surveyed own neither a cat nor a dog?
   A) 12 B) 25 C) 3 D) 10

8) Monticello residents were surveyed concerning their preferences for candidates Moore and Allen in an upcoming election. Of the 800 respondents, 300 support neither Moore nor Allen, 100 support both Moore and Allen, and 250 support only Moore. How many residents support Moore or Allen?
   A) 500 B) 400 C) 100 D) 300

2.4 Set Operations and Venn Diagrams with Three Sets

1 Perform Set Operations with Three Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the 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 ∪ (B ∩ C)
A) {q, s, u, w, y, z} B) {q, w, y} C) {q, y, z} D) {q, r, w, y, z}

2) A ∩ (B ∪ C)
A) {q, s, w, y} B) {q, y, z} C) {q, r, w, y, z} D) {q, s, u, w, y, z}

3) (A ∪ B) ∩ (A ∪ C)
A) {q, s, u, w, y, z} B) {r, t, v, x} C) {q, s, w, y} D) {q, s, u, w, y}

4) (A ∩ B) ∪ (A ∩ C)
A) {q, s, w, y} B) {r, t, u, v, x, z} C) {q, s, u, w, y} D) {q, s, v, w, y}

5) A' ∩ (B ∪ C')
A) {r, t, z} B) {q, s, u, v, x, y} C) {q, r, s, t, z} D) {q, r, s}

6) (A' ∩ B) ∪ (A' ∩ C')
A) {r, t, z} B) {q, s, u, v, x, y} C) {q, r, t, y, z} D) {r, s, t, y, z}

7) (A ∪ B ∪ C)'
A) {r, t} B) {s, t} C) {q, s} D) {v, z}

8) (A ∩ B ∩ C)'
A) {q, r, s, t, u, v, w, x, z} B) ∅
C) {q, s, u, w, z} D) {r, t, v, x}

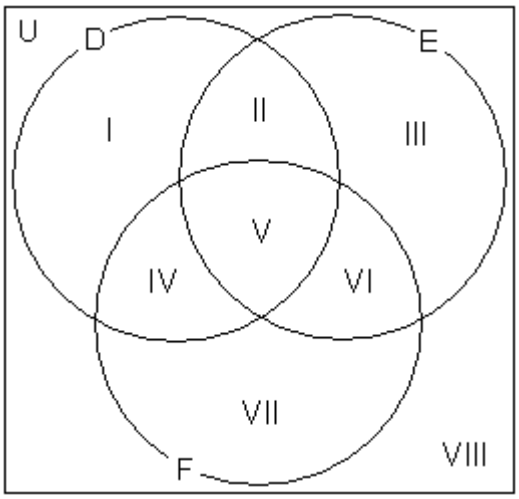
9) (A ∪ B)' ∩ C
A) {v, x} B) {q, v, x} C) {s, u, v, z} D) {r, w}

10) (B ∪ C)' ∩ A
A) {u} B) {w} C) {v} D) ∅

2 Use Venn Diagrams with Three Sets

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the Venn diagram shown to answer the question.



1) Which regions represent set E?
A) II, III, V, VI B) I, IV, VII C) VIII D) III

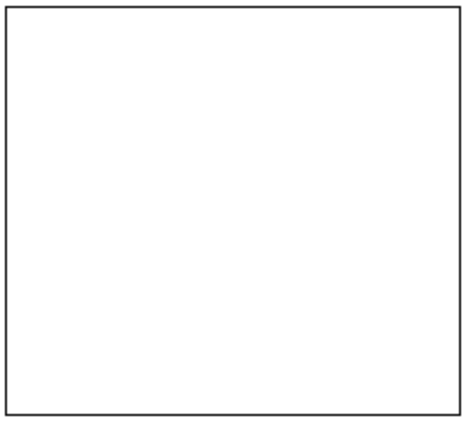
2) Which regions represent set D ∪ F?
A) I, II, IV, V, VI, VII B) III
C) VIII D) I, II, IV, V, VI, VII, VIII

3) Which regions represent set D ∩ E?
A) II, V B) I, III, IV, VI C) VIII D) IV, V

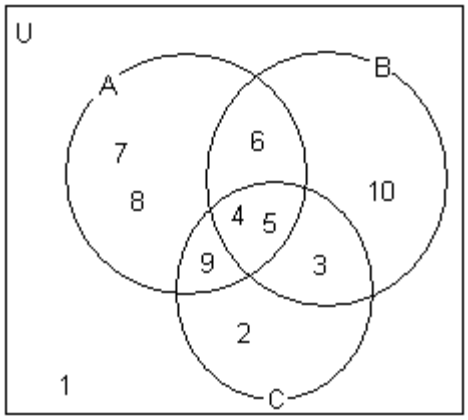
4) Which regions represent set E'?
A) I, IV, VII, VIII B) II, III, V, VI C) VIII D) II, V, VI

Construct a Venn diagram illustrating the given sets.

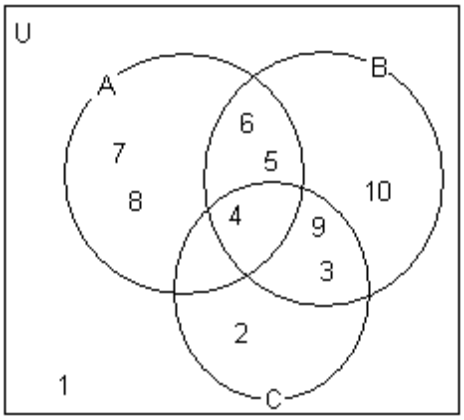
5) A = [4, 5, 6, 7, 8, 9], B = [3, 4, 5, 6, 10], C = [2, 3, 4, 5, 9], U = [1, 2, 3, 4, 5, 6, 7, 8, 9, 10]



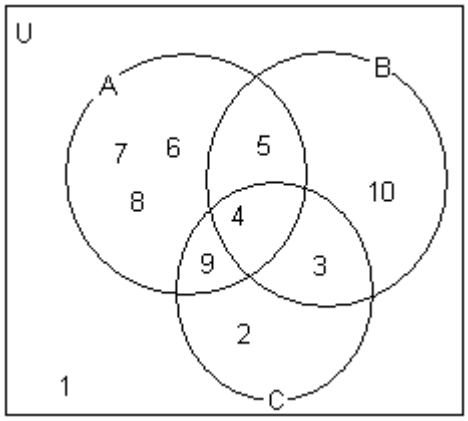
A)



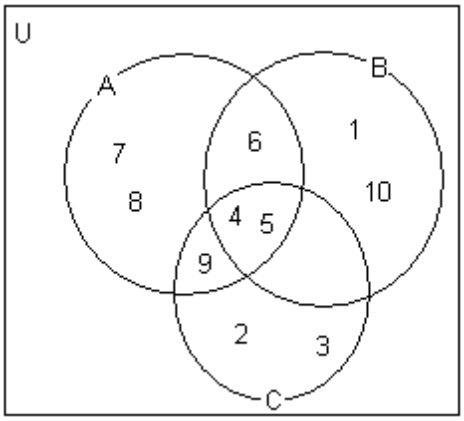
B)



C)

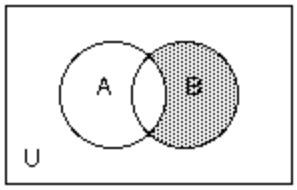


D)



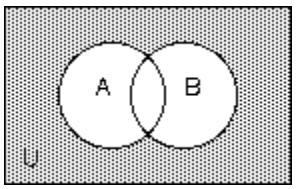
Use set notation to identify the shaded region.

6)



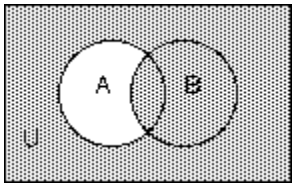
A) $B \cap \overline{A}$ B) $A \cap \overline{B}$ C) $A - B$ D) $B - \overline{A}$

7)



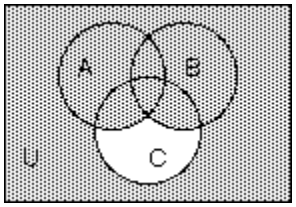
A) $\overline{A} \cap \overline{B}$ B) $A - B$ C) $\overline{A \cap B}$ D) $A \cup B$

8)



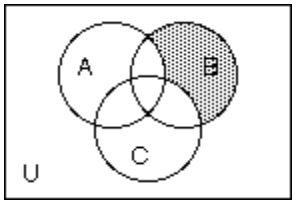
A) A' ∪ B B) B ∩ A' C) A' ∩ B D) (A ∩ B)'

9)



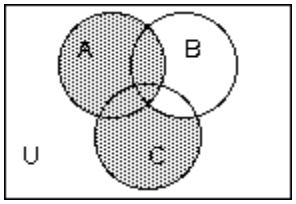
A) (A ∪ B) ∪ C' B) (A ∩ B) ∪ C' C) (A ∪ B) ∩ C' D) (A ∪ B ∪ C)'

10)



A) A' ∩ C' ∩ B B) B ∩ (A ∩ C)' C) B' ∩ (A ∪ B) D) A ∩ B ∩ C

11)



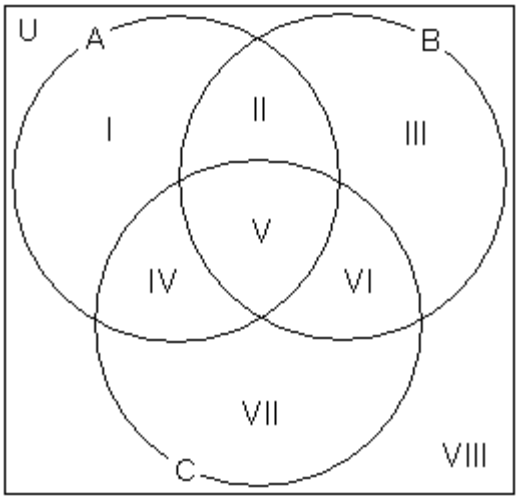
A) (C ∩ B') ∪ A B) A ∪ C C) (A ∪ C) ∩ B' D) B' ∩ (A ∪ C)

The chart shows the most common causes of death in certain areas of the United States.

Most Common Causes of Death in U.S.

Region A	Region B	Region C
1. heart disease	1. heart disease	1. heart disease
2. cerebrovascular	2. cerebrovascular	2. cerebrovascular
3. COPD	3. COPD	3. COPD
4. pneumonia	4. accidents	4. accidents
5. accidents	5. pneumonia	5. liver disease

Use the Venn diagram to indicate in which region each cause should be placed.



12) liver disease
A) VII B) V C) VI D) IV

13) pneumonia
A) II B) V C) VI D) IV

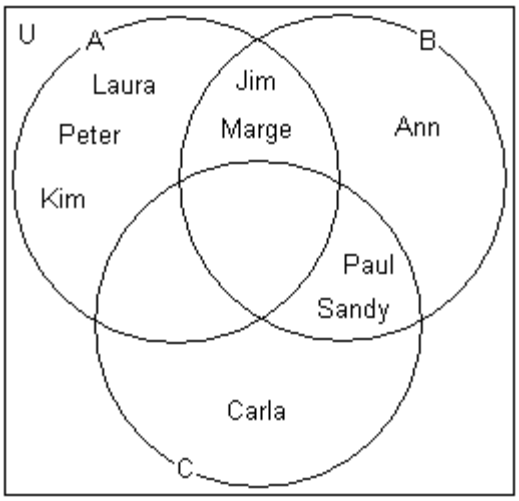
14) heart disease
A) V B) II C) VI D) IV

Use the following information to construct a Venn Diagram that illustrates the given sets.

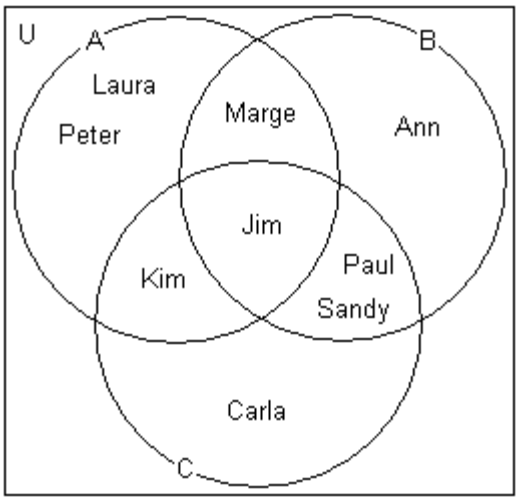
15) U = the set of members of the bookclub shown in the chart
A = the set of members of the bookclub who read at least 25 books
B = the set of members of the bookclub who suggested 5 or less books
C = the set of members of the bookclub who have been members for less than 7 years

Members of the bookclub	Numbers of books read	Numbers of books suggested	Years of membership
Carla	20	7	6
Marge	25	1	7
Sandy	5	1	3
Laura	44	15	9
Kim	42	11	9
Peter	34	9	8
Jim	41	4	7
Ann	24	1	7
Paul	17	0	5

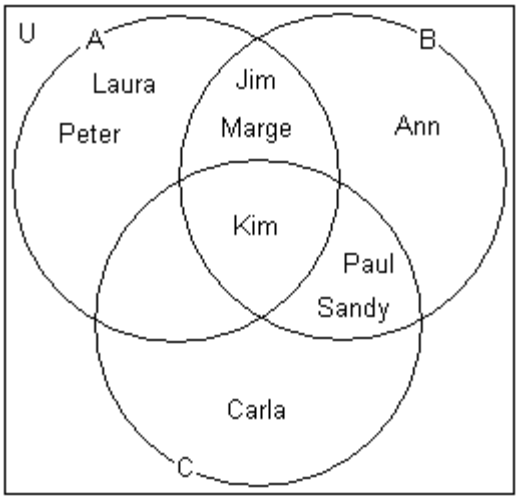
A)



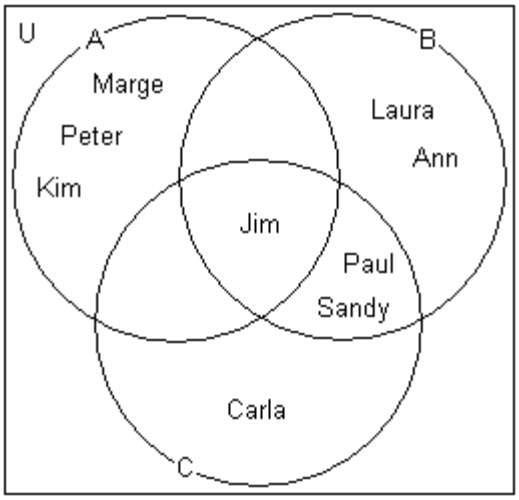
B)



C)



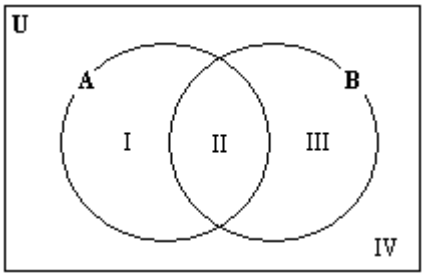
D)



3 Use Venn Diagrams to Prove Equality of Sets

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

Use the Venn diagram shown below to solve the problem.



1) a) Which regions are represented by $A \cap B'$?
b) Which regions are represented by $(A' \cup B)'$?
c) Based on parts a) and b), what can you conclude about the relationship between $A \cap B'$ and $(A' \cup B)'$?

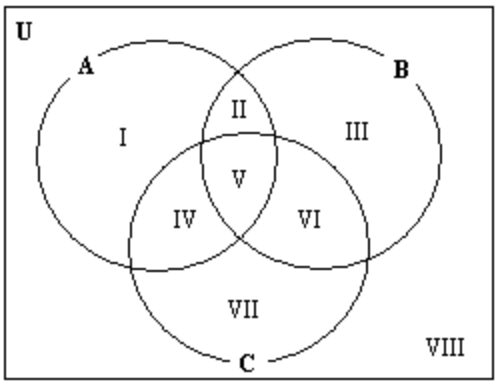
2) a) Which regions are represented by $(A' \cap B)'$?
b) Which regions are represented by $A \cap B'$?
c) Based on parts a) and b), what can you conclude about the relationship between $(A' \cap B)'$ and $A \cap B'$?

3) a) Which regions are represented by $(A \cup B')'$?
b) Which regions are represented by $A' \cap B$?
c) Based on parts a) and b), what can you conclude about the relationship between $(A \cup B')'$ and $A' \cap B$?

4) a) Which regions are represented by $(A' \cup B)'$?
b) Which regions are represented by $A' \cap B$?
c) Based on parts a) and b), what can you conclude about the relationship between $(A' \cup B)'$ and $A' \cap B$?

5) Show that $(A' \cap B)' = A \cup B'$.

Use the Venn diagram shown below to solve the problem.



6) a) Which regions are represented by $(A \cap B) \cup C$?
b) Which regions are represented by $(A \cup C) \cap (A \cup B)$?
c) Based on parts a) and b), what can you conclude about the relationship between $(A \cap B) \cup C$ and $(A \cup C) \cap (A \cup B)$?

7) a) Which regions are represented by $B \cup (A \cap C)$?
b) Which regions are represented by $(A \cup B) \cap (B \cup C)$?
c) Based on parts a) and b), what can you conclude about the relationship between $B \cup (A \cap C)$ and $(A \cup B) \cap (B \cup C)$?

8) Show that $B \cup (A \cap C) = (A \cup B) \cap (B \cup C)$.

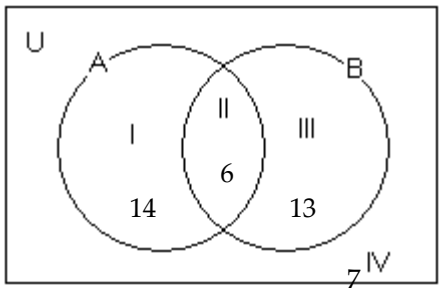
2.5 Survey Problems

1 Use Venn Diagrams to Visualize a Survey's Results

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Use the accompanying Venn diagram that shows the number of elements in regions I through IV to answer the question.

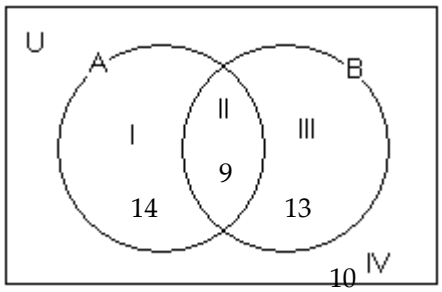
1)



How many elements belong to set A?

A) 20 B) 14 C) 6 D) 13

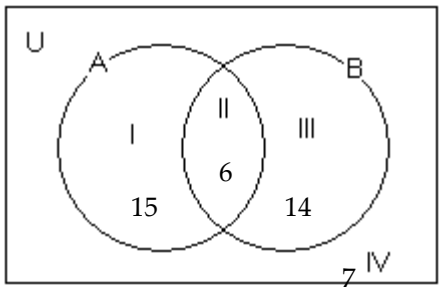
2)



How many elements belong to set B?

A) 22 B) 23 C) 13 D) 27

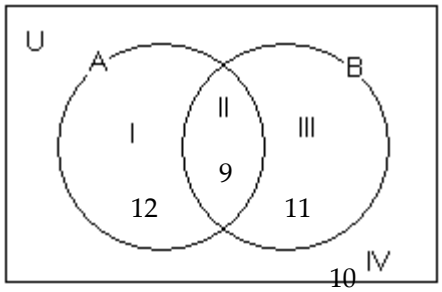
3)



How many elements belong to set A but not set B?

A) 15 B) 6 C) 14 D) 7

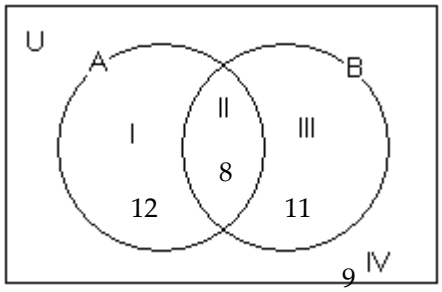
4)



How many elements belong to set B but not set A?

A) 11 B) 12 C) 9 D) 10

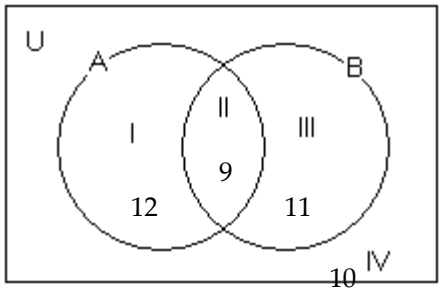
5)



How many elements belong to set A or set B?

A) 31 B) 40 C) 23 D) 8

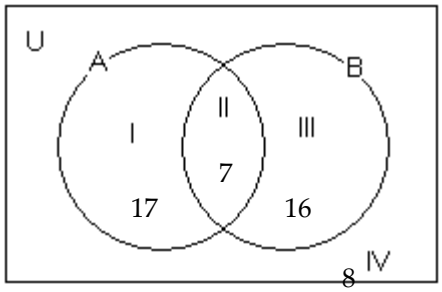
6)



How many elements belong to set A and set B?

A) 9 B) 32 C) 10 D) 23

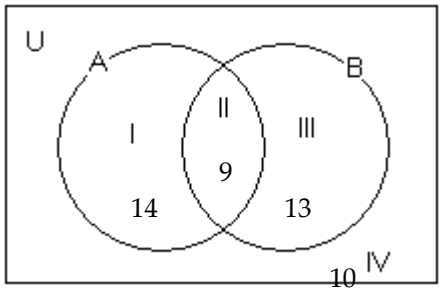
7)



How many elements belong to neither set A nor set B?

A) 8 B) 7 C) 16 D) 17

8)

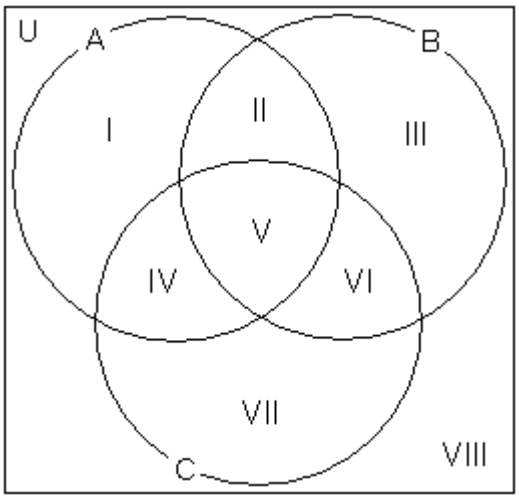


How many elements are there in the universal set?

A) 46 B) 36 C) 27 D) ∅

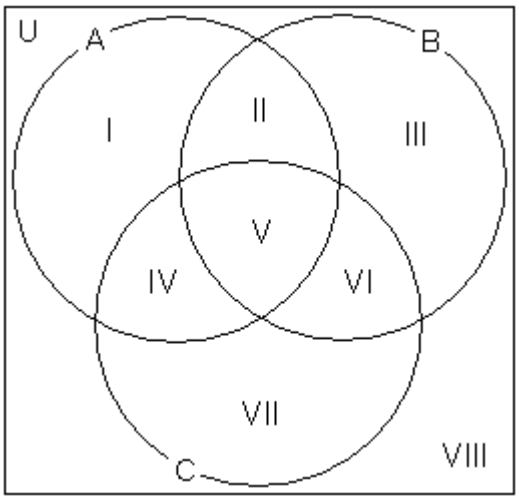
Use the given cardinalities to determine the number of elements in the specific region.

9) n(U) = 125, n(A) = 40, n(B) = 60, n(C) = 36, n(A ∩ B) = 15, n(A ∩ C) = 18, n(B ∩ C) = 14, n(A ∩ B ∩ C) = 8
Find III.



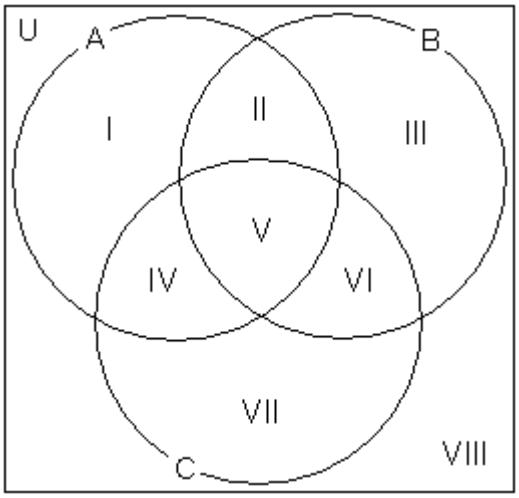
A) 39 B) 10 C) 20 D) 26

10) n(U) = 125, n(A) = 40, n(B) = 60, n(C) = 36, n(A ∩ B) = 15, n(A ∩ C) = 18, n(B ∩ C) = 14, n(A ∩ B ∩ C) = 8
Find VIII.



A) 28 B) 44 C) 40 D) 0

11) n(U) = 109, n(A) = 76, n(B) = 54, n(C) = 52, n(A ∩ B) = 32, , n(A ∩ C) = 29, n(B ∩ C) = 27, n(A ∩ B ∩ C) = 15
Find VI.



A) 12 B) 11 C) 13 D) 14

Use a Venn diagram to answer the question.

12) At East Zone University (EZU) there are 606 students taking College Algebra or Calculus. 284 are taking College Algebra, 367 are taking Calculus, and 45 are taking both College Algebra and Calculus. How many are taking Algebra but not Calculus?
A) 239 B) 322 C) 561 D) 194

13) At East Zone University (EZU) there are 520 students taking College Algebra or Calculus. 368 are taking College Algebra, 190 are taking Calculus, and 38 are taking both College Algebra and Calculus. How many are taking Calculus but not Algebra?
A) 152 B) 330 C) 482 D) 292

14) A local television station sends out questionnaires to determine if viewers would rather see a documentary, an interview show, or reruns of a game show. There were 200 responses with the following results:

60 were interested in an interview show and a documentary, but not reruns;
8 were interested in an interview show and reruns, but not a documentary;
28 were interested in reruns but not documentaries or interviews;
48 were interested in an interview show but not a documentary;
20 were interested in a documentary and reruns;
12 were interested in an interview show and reruns;
16 were interested in none of the three.

How many are interested in exactly one kind of show?

A) 96 B) 106 C) 86 D) 76

2 Use Survey Results to Complete Venn Diagrams and Answer Questions about the Survey

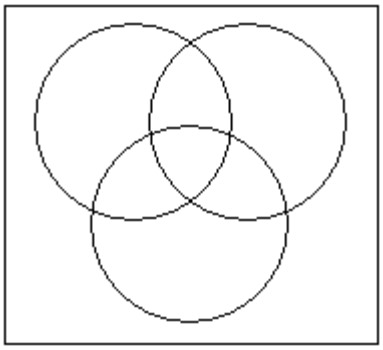
SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

A pollster conducting a telephone poll asked three questions:
1. Are you religious?
2. Have you spent time with a person convicted of a crime?
3. Are you in favor of the death penalty?
Solve the problem.

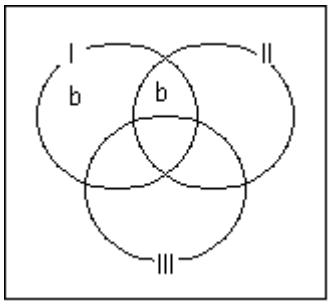
1) Construct a Venn Diagram with three circles that can assist the pollster in tabulating the responses to the three questions.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

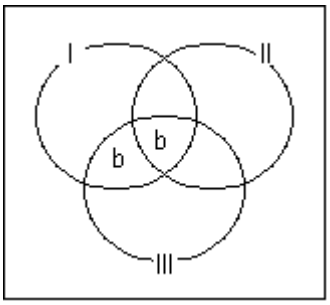
2) Write the letter b in every region of the diagram that represents all religious persons polled who are not in favored of death penalty.



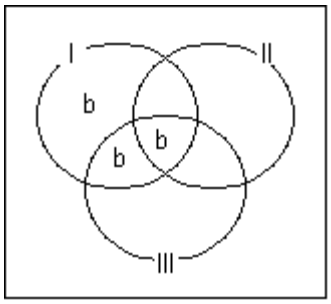
A)



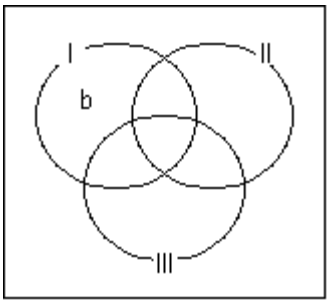
B)



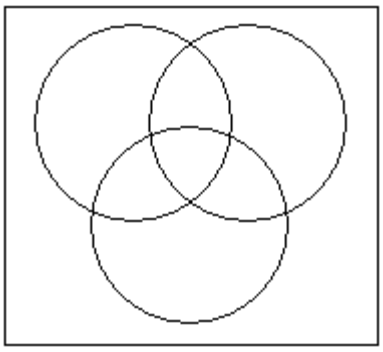
C)



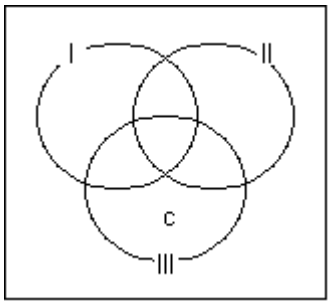
D)



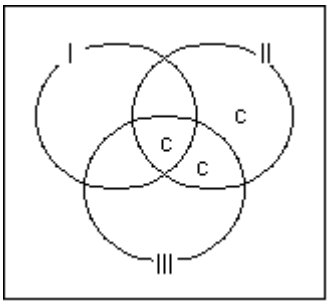
3) Write the letter c in every region of the diagram that represents the people polled who do not consider themselves religious, who have not spent time with a person convicted with a crime, and who are in favor of the death penalty.



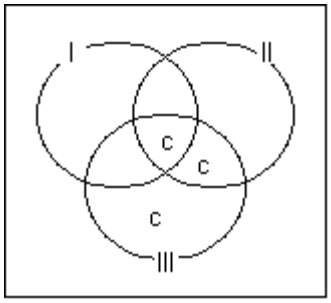
A)



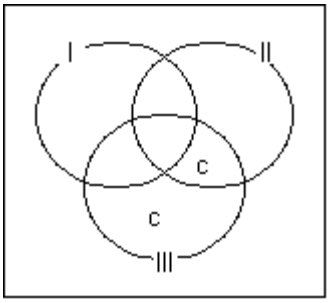
B)



C)



D)

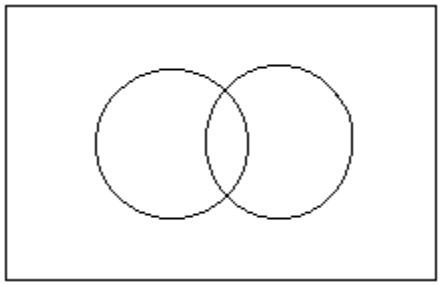


Solve the problem.

4) A pollster conducting a telephone poll asked two questions:

1. Would you like to live to be 100 years old, if it was possible?
2. Do you have confidence that medical science will find cures for major diseases during your lifetime?

Construct a Venn diagram that allows the respondents to the poll to be identified by whether or not they want to live to be 100 and whether or not they believe cures for major diseases will be found.

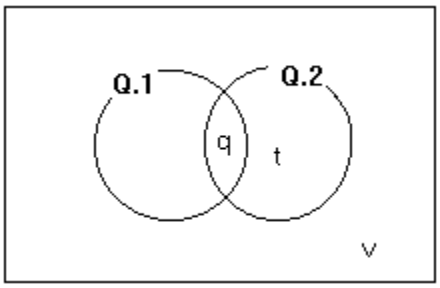


Write the letter q in the region of the diagram that identifies those would like to live to be 100 who believe cures will be found.

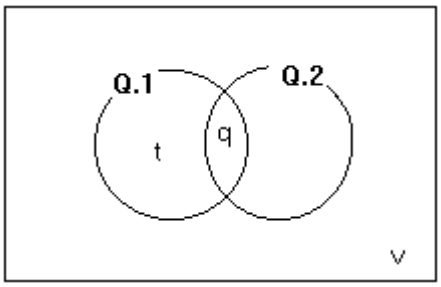
Write the letter t in the region of the diagram that identifies those would not like to live to be 100 who believe cures will be found.

Write the letter v in the region of the diagram that identifies those would not like to live to be 100 who believe cures will not be found.

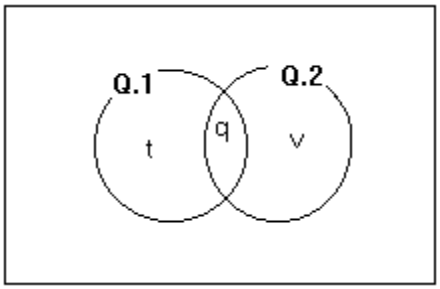
A)



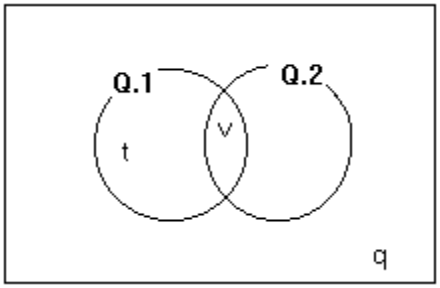
B)



C)



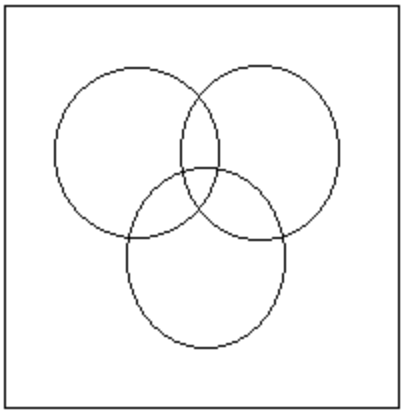
D)



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

5) A pollster conducting a telephone poll asked three questions:
   1. Are you a registered voter?
   2. Do you currently have any children in grades kindergarten through 12th grade?
   3. Would you support a tax increase to build a new school?

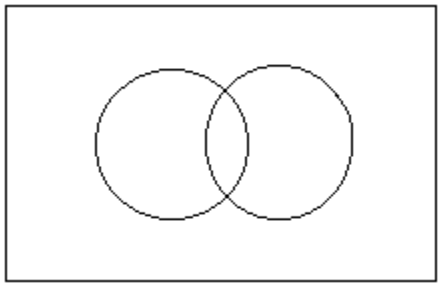
Construct a Venn diagram with three circles that can assist the pollster in tabulating the responses to the three questions.



Write the letter h in the region of the diagram that identifies all registered voters polled who do not have children in school and who do not support a tax increase.
Write the letter j in the region of the diagram that identifies people who are not registered to vote, who do not have children in school, and who do not support a tax increase.
Write the letter k in the region of the diagram that identifies all registered voters polled who have children in school, and who do not support a tax increase.

6) There are 777,859 physicians in the United States.
177,030 are women.
33,947 physicians have cardiology as their specialty.
6,817 women physicians specialize in cardiology.

Identify the Venn diagram in which U is the set of all physicians, W is the set of all women physicians, and C is the set of all U.S. physicians specializing in cardiology. Fill in each of the four regions of the Venn diagram with the number of physicians who belong to that region.



Use your Venn diagram to answer the questions.

How many physicians in the United States are there who are men specializing in cardiology?
How many male physicians in the United States do not specialize in cardiology?

Ch. 2 Set Theory
Answer Key

2.1 Basic Set Concepts

1 Determine Whether the Collections are Well Defined or Not
1) A
2) B

2 Use Three Methods to Represent Sets
1) A
2) A
3) A
4) A

3 Use Roster Method
1) A
2) A
3) A
4) A
5) A

4 Define and Recognize the Empty Set
1) B
2) B
3) B
4) A
5) A
6) B
7) B

5 Use the Symbols $\in$ and $\notin$
1) A
2) A
3) B
4) A
5) B
6) B
7) B
8) A

6 Find the Cardinal Number for Each Set
1) A
2) A
3) A
4) A
5) A
6) A
7) A

7 Recognize Equivalent Sets
1) B
2) A
3) A
4) B
5) A

8 Recognize Equal Sets
1) A
2) B
3) A

4) B
5) B
6) B
7) A

9 Distinguish Between Finite and Infinite sets

1) B
2) A
3) A
4) A

10 Apply Set Notation to Sets of Natural Numbers

1) A
2) A

11 Solve Applications

1) A
2) A
3) A

2.2 Subsets

1 Recognize Subsets and Use the Notation $\subset, \subseteq$

1) A
2) B
3) B
4) B
5) A
6) B
7) A
8) A
9) A

2 Determine Whether Each Statement is True or False

1) B
2) A
3) A
4) B
5) A

3 Determine the Number of Subsets of a Set

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A

4 Apply Concepts of Subsets and Equivalent Sets to Infinite Sets

1) B
2) A
3) B
4) A
5) B

5 Solve Applications

1) B
2) A
3) A

4) B
5) A
6) A
7) A
8) A
9) A

2.3 Venn Diagrams and Set Operations

1 Understand the Meaning of a Universal Set

1) Answers may vary. One possible answer is: U = the set of all famous composers.
2) Answers may vary. One possible answer is: U = the set of all non-carbonated beverages.
3) A
4) A
5) A

2 Perform Operations with Sets

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A
15) A
16) A
17) A
18) A

3 Use Venn Diagrams to Visualize Relationships Between Two Sets

1) A
2) A
3) A
4) A
5) A
6) A

4 Use the Formula for n(A ∪ B)

1) A
2) A
3) A

5 Find Each of the Given Sets

1) A
2) A
3) A
4) A

6 Determine Sets Involving Set Operations from a Venn Diagram

1) A
2) A
3) A

4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A

7 Solve Applications

1) A
2) A
3) A
4) A

8 Understanding Palindromic Number

1) A
2) A
3) A
4) A

9 Solve Apps: Venn Diagram

1) A
2) D
3) A
4) A
5) A
6) A
7) A
8) A

2.4 Set Operations and Venn Diagrams with Three Sets

1 Perform Set Operations with Three Sets

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A

2 Use Venn Diagrams with Three Sets

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A

13) A
14) A
15) A

3 Use Venn Diagrams to Prove Equality of Sets

1) a) I b) I c) They are equal.
2) a) I, II, and IV b) I c) They are not equal.
3) a) III b) III c) They are equal.
4) a) I b) III c) They are not equal.
5) A' = III, IV
B = II, III
(A' ∩ B) = III
(A' ∩ B)' = I, II, IV

A = I, II
B' = I, IV
A ∪ B' = I, II, IV
6) a) II, IV, V, VI, and VII b) I, II, IV, V, and VI c) They are not equal.
7) a) II – VI b) II – VI c) They are equal.
8) (A ∩ C) = IV, V
B = II, III, V, VI
B ∪ (A ∩ C) = II, III, IV, V, VI

(A ∪ B) = I, II, III, IV, V, VI
(B ∪ C) = II, III, IV, V, VI, VII
(A ∪ B) ∩ (B ∪ C) = II, III, IV, V, VI

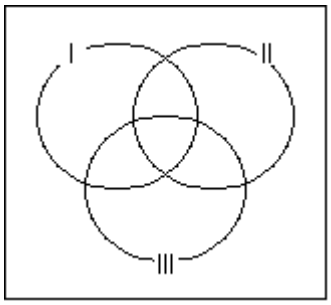
2.5 Survey Problems

1 Use Venn Diagrams to Visualize a Survey's Results

1) A
2) A
3) A
4) A
5) A
6) A
7) A
8) A
9) A
10) A
11) A
12) A
13) A
14) A

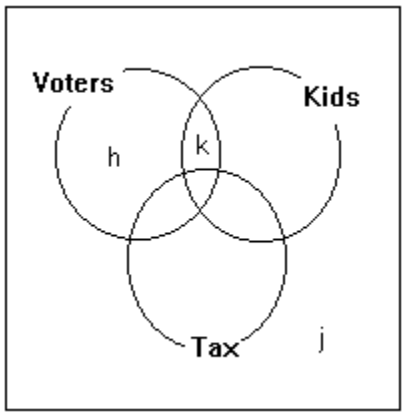
2 Use Survey Results to Complete Venn Diagrams and Answer Questions about the Survey

1)

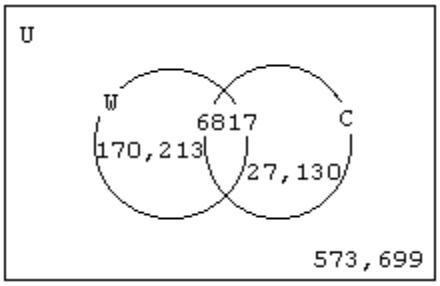


2) A

3) A
4) A
5)



6)



27,130 male physicians in the United States specialize in cardiology.
573,699 male physicians in the United States do not specialize in cardiology.