

**7.1 Sets** -----

Insert " $\subseteq$ " or " $\not\subseteq$ " in the blank to make the statement true.

1)  $\emptyset$   $\underline{\hspace{1cm}}$   $\{5, 7, 9\}$

2)  $\{m, p, c\}$   $\underline{\hspace{1cm}}$   $\{m, p, c\}$

3)  $\{x \mid x \text{ is a counting number larger than } 5\}$   $\underline{\hspace{1cm}}$   $\{7, 8, 9, \dots\}$

Let  $A = \{1, 3, 5, 7\}$ ;  $B = \{5, 6, 7, 8\}$ ;  $C = \{5, 8\}$ ;  $D = \{2, 5, 8\}$ ; and  $U = \{1, 2, 3, 4, 5, 6, 7, 8\}$ . Determine whether the given statement is true or false.

4)  $A \subset A$

5)  $B \subseteq B$

6)  $\{5\} \subseteq D$

Find the number of subsets of the set.

7)  $\{\text{mom, dad, son, daughter}\}$

8)  $\{1, 2, 3, \dots, 8\}$

**Decide whether the statement is true or false.**

9)  $\{8, 16, 24, 32\} \cap \{8, 24\} = \{8, 16, 24, 32\}$

10)  $\{12, 13, 6\} \cup \emptyset = \{12, 13, 6\}$

11)  $\{3, 5, 7\} \cap \{4, 6, 7\} = \{7\}$

**Let  $U = \{q, r, s, t, u, v, w, x, y, z\}$ ;  $A = \{q, s, u, w, y\}$ ;  $B = \{q, s, y, z\}$ ; and  $C = \{v, w, x, y, z\}$ . List the members of the indicated set, using set braces.**

12)  $B'$

13)  $A' \cup B$

14)  $A \cup (B \cap C)$

15)  $C' \cup A'$

16)  $C' \cap A'$

Let  $U = \{\text{all soda pops}\}$ ;  $A = \{\text{all diet soda pops}\}$ ;  $B = \{\text{all cola soda pops}\}$ ;  $C = \{\text{all soda pops in cans}\}$ ; and  $D = \{\text{all caffeine-free soda pops}\}$ . Describe the given set in words.

17)  $A \cup D$

18)  $A' \cap C$

19)  $(A \cup B) \cup D$

Let  $A = \{ 6, 4, 1, \{3, 0, 8\}, \{9\} \}$ . Determine whether the statement is true or false.

20)  $\{6\} \in A$

21)  $\{3, 0, 8\} \in A$

22)  $\{9\} \subset A$

The lists below show five agricultural crops in Alabama, Arkansas, and Louisiana.

<u>Alabama</u>	<u>Arkansas</u>	<u>Louisiana</u>
soybeans (s)	soybeans (s)	soybeans (s)
peanuts (p)	rice (r)	sugarcane (n)
corn (c)	cotton (t)	rice (r)
hay (h)	hay (h)	corn (c)
wheat (w)	wheat (w)	cotton (t)

Let  $U$  be the smallest possible set that includes all of the crops listed; and let  $A$ ,  $K$ , and  $L$  be the sets of five crops in Alabama, Arkansas, and Louisiana, respectively. Find the indicated set.

23)  $A \cup L$

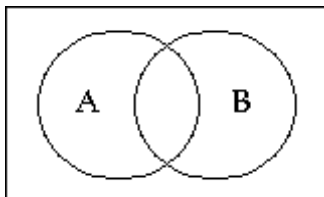
24)  $A' \cup L$

25)  $L' \cap (A \cup K)$

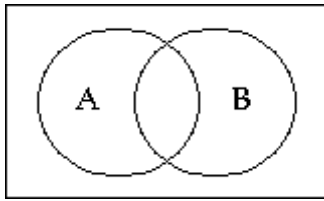
## 7.2 Venn Diagrams -----

Shade the Venn diagram to represent the set.

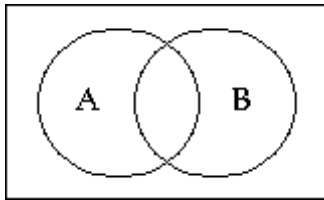
26)  $A' \cap B'$



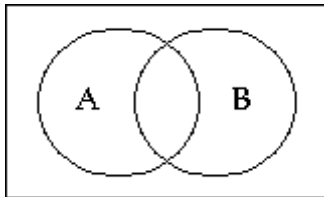
27)  $A' \cup B$



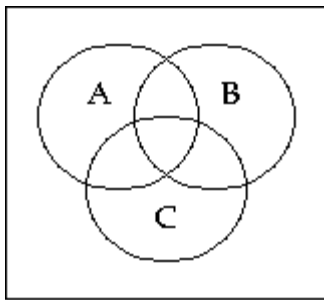
28)  $A' \cup (A \cap B)$



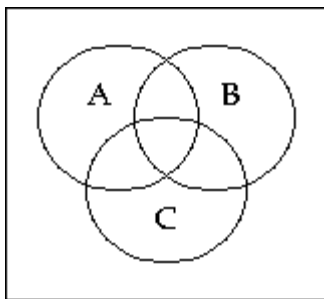
29)  $(A \cap B) \cup (A \cup B)'$



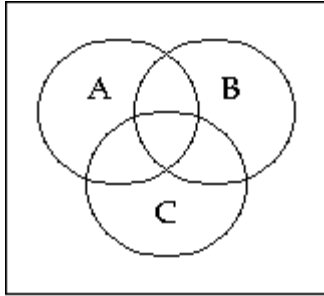
30)  $(A \cap B \cap C)'$



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



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



**Use the union rule to answer the question.**

33) If  $n(A) = 4$ ,  $n(B) = 9$ , and  $n(A \cap B) = 2$ ; what is  $n(A \cup B)$ ?

34) If  $n(B) = 48$ ,  $n(A \cap B) = 9$ , and  $n(A \cup B) = 84$ ; what is  $n(A)$ ?

**Use a Venn Diagram and the given information to determine the number of elements in the indicated region.**

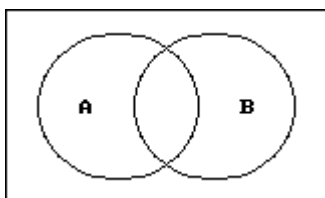
35)  $n(A) = 33$ ,  $n(B) = 15$ ,  $n(A \cup B) = 42$ ,  $n(B') = 40$ . Find  $n(A \cap B)'$ .

36)  $n(A \cup B \cup C) = 77$ ,  $n(A \cap B \cap C) = 11$ ,  $n(A \cap B) = 24$ ,  $n(A \cap C) = 21$ ,  $n(B \cap C) = 19$ ,  $n(A) = 56$ ,  $n(B) = 38$ , and  $n(C) = 36$ . Find  $n(A' \cap B \cap C)$

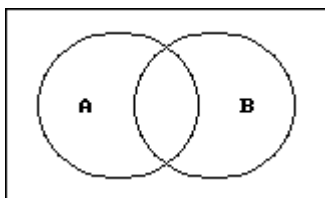
37)  $n(U) = 76$ ,  $n(A) = 39$ ,  $n(B) = 31$ ,  $n(C) = 25$ ,  $n(A \cap B) = 8$ ,  $n(A \cap C) = 6$ ,  $n(B \cap C) = 8$ , and  $n(A \cap (B \cap C)) = 3$ . Find  $n(A \cap (B \cup C)')$ .

Use a Venn diagram to decide if the statement is true or false.

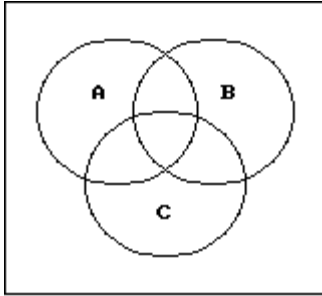
38)  $A \cap B' = (A' \cup B)'$



39)  $(A \cup B)' = A' \cap B$



40)  $(A \cap B) \cup C = (A \cup C) \cap (A \cup B)$



**Use a Venn diagram to answer the question.**

- 41) At East Zone University (EZU) there are 896 students taking College Algebra or Calculus. 520 are taking College Algebra, 407 are taking Calculus, and 31 are taking both College Algebra and Calculus. How many are taking Calculus but not Algebra?

- 42) 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 950 responses with the following results:  
 285 were interested in an interview show and a documentary, but not reruns;  
 38 were interested in an interview show and reruns, but not a documentary;  
 133 were interested in reruns but not an interview show;  
 228 were interested in an interview show but not a documentary;  
 95 were interested in a documentary and reruns;  
 57 were interested in an interview show and reruns;  
 76 were interested in none of the three.  
 How many are interested in exactly one kind of show?



- 43) A survey of a group of 113 tourists was taken in St. Louis. The survey showed the following:
- 63 of the tourists plan to visit Gateway Arch;
  - 48 plan to visit the zoo;
  - 9 plan to visit the Art Museum and the zoo, but not the Gateway Arch;
  - 13 plan to visit the Art Museum and the Gateway Arch, but not the zoo;
  - 17 plan to visit the Gateway Arch and the zoo, but not the Art Museum;
  - 9 plan to visit the Art Museum, the zoo, and the Gateway Arch;
  - 15 plan to visit none of the three places.
- How many plan to visit the Art Museum only?

**Find the number of elements in the indicated set by referring to the given table.**

- 44)  $V \cap (P \cup W)$ ,  
given the following table:

U.S. Production (in Thousands of Tons) of Certain Nuts				
Year	Pecans (P)	Almonds (A)	Walnuts (W)	Hazelnuts (H)
1993 (T)	180	584	232	41
1994 (F)	99	584	232	21
1995 (V)	134	304	232	39
1996 (S)	111	412	205	17

- 45) The table below shows the results of a poll taken in a U.S. city in which people are asked which candidate they intend to vote for in an upcoming presidential election.

	NonHispanic White (A)	Hispanic (B)	African- American (C)	Asian American (E)	American Indian (F)	
Democrat (D)	237	112	86	140	16	591
Republican (R)	241	64	32	175	5	517
Other (O)	25	23	12	15	17	92
Totals	503	199	130	330	38	1200

Find the number of people in the set  $O \cap A'$

- 46) The table below shows the results of a poll taken in a U.S. city in which people are asked which candidate they intend to vote for in an upcoming presidential election.

	NonHispanic White (A)	Hispanic (B)	African- American (C)	Asian American (E)	American Indian (F)	
Democrat (D)	237	112	86	140	16	591
Republican (R)	241	64	32	175	5	517
Other (O)	25	23	12	15	17	92
Totals	503	199	130	330	38	1200

Find the number of people in the set  $R' \cup (A \cup F)$

### 7.3 Probability -----

**Write the sample space for the given experiment.**

- 47) A box contains 10 red cards numbered 1 through 10. One card is drawn at random and its number is recorded.

- 48) A coin is tossed, and then a die is rolled.

**A die is rolled twice. Write the indicated event in set notation.**

- 49) The sum of the rolls is 5.

**Write the indicated event in set notation.**

50) When four coins are tossed, the first three tosses come up the same.

[Hint: when four coins are tossed, the following 16 outcomes are possible:

HHHH	HHHT	HHTH	HHTT
HTHH	HTHT	HTTH	HTTT
THHH	THHT	THTH	THTT
TTHH	TTHT	TTTH	TTTT ]

**Find the probability of the given event.**

51) A single fair die is rolled. The number on the die is prime.

52) Two fair dice are rolled. The sum of the numbers on the dice is 1 or 5.

**Find the probability.**

53) When a single card is drawn from a well-shuffled 52-card deck, find the probability of getting a club.

54) A card is drawn from a well-shuffled deck of 52 cards. What is the probability of drawing an ace or a 7?

55) A card is drawn from a well-shuffled deck of 52 cards. What is the probability of drawing a black card that is not a face card?

56) A lottery game has balls numbered 1 through 15. What is the probability that a randomly selected ball is an even numbered ball or a 10?

57) Each digit from the number 5,979,669 is written on a different card. If one of these cards is selected at random, what is the probability of drawing a card that shows 5 or 6?

**Identify the probability statement as empirical or not.**

58) The probability of a forest fire in Yellowstone National Park this year is 0.30.

59) The probability of getting heads on two consecutive tosses of a coin is 0.25.

**Find the indicated probability.**

60) The distribution of B.A. degrees conferred by a local college is listed below, by major.

<u>Major</u>	<u>Frequency</u>
English	2073
Mathematics	2164
Chemistry	318
Physics	856
Liberal Arts	1358
Business	1676
Engineering	<u>868</u>
	9313

What is the probability that a randomly selected degree is in Engineering?

- 61) A survey resulted in the sample data in the given table. If one of the survey respondents is selected at random, find the probability that the person lives in a flat.

Type of Accommodation	Number
House	358
Flat	469
Apartment	363
Other	647

- 62) College students were given three choices of pizza toppings and asked to choose one favorite. The following table shows the results.

topping	Freshman	Sophomore	Junior	Senior
cheese	14	11	26	26
meat	23	26	11	14
veggie	11	14	23	26

Find the probability that a randomly selected student prefers cheese toppings.

- 63) The following contingency table shows the popular votes cast in the 1984 presidential election by region and political party. Round your answer to three decimal places.

Region	Political Party		
	Democratic	Republican	Other
Northeast	9046	11,336	101
Midwest	10,511	14,761	169
South	10,998	17,699	136
West	7022	10,659	214
Totals	37,577	54,455	620

A person who voted Republican in the 1984 presidential election is selected at random. Find the probability that the person was from the Midwest.

- 64) The following contingency table shows age at retirement (broken down by career) for a group of retired people.

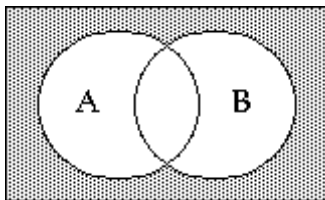
Career	Retirement Age			
	50-55	56-60	61-65	Over 65
Attorney	12	34	77	45
College Professor	8	47	93	32
Administrative Assistant	21	45	63	49
Store Clerk	18	44	70	50
Totals	59	170	303	176

Suppose one of these people is selected at random from the 61-65 age group. Find the probability that the person selected was an attorney.

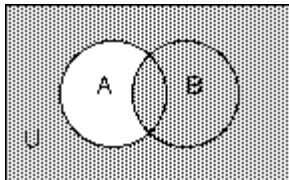
# Answer Key

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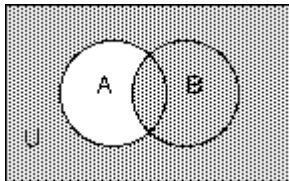
- 1)  $\subseteq$
- 2)  $\subseteq$
- 3)  $\not\subseteq$
- 4) False
- 5) True
- 6) True
- 7) 16
- 8) 256
- 9) False
- 10) True
- 11) True
- 12)  $\{r, t, u, v, w, x\}$
- 13)  $\{q, r, s, t, v, x, y, z\}$
- 14)  $\{q, s, u, w, y, z\}$
- 15)  $\{q, r, s, t, u, v, x, z\}$
- 16)  $\{r, t\}$
- 17) All soda pops that are diet or caffeine-free soda pops
- 18) All non-diet soda pops in cans
- 19) All soda pops that are diet, cola, or caffeine-free
- 20) False
- 21) True
- 22) False
- 23)  $\{c, h, n, p, r, s, t, w\}$
- 24)  $\{c, n, r, s, t\}$
- 25)  $\{h, p, w\}$
- 26)



27)



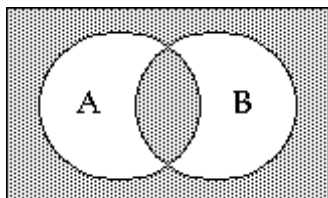
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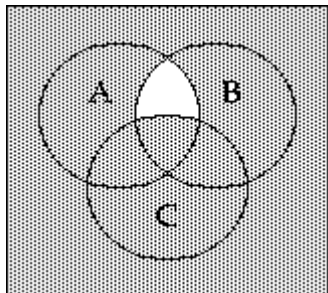
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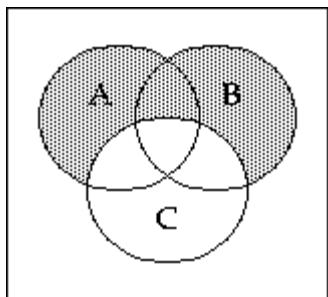
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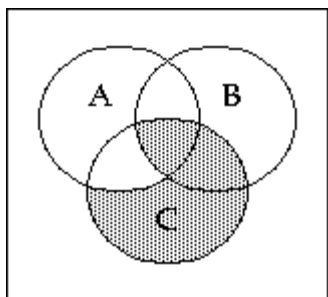
30)



31)



32)



33) 11

34) 45

35) 49

36) 8

37) 28

38) True

39) True

40) False

41) 376

42) 456

43) 13

44) 366

45) 67



## Answer Key

Testname: MATH230\_LIAL\_HW7A

46) 929

47) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

48) {(h, 1), (h, 2), (h, 3), (h, 4), (h, 5), (h, 6), (t, 1), (t, 2), (t, 3), (t, 4), (t, 5), (t, 6)}

49) {(1, 4), (2, 3), (3, 2), (4, 1)}

50) {HHHH, HHHT, TTTH, TTTT}

51)  $\frac{1}{2}$

52)  $\frac{1}{9}$

53)  $\frac{1}{4}$

54)  $\frac{2}{13}$

55)  $\frac{5}{13}$

56)  $\frac{7}{15}$

57)  $\frac{3}{7}$

58) Empirical

59) Not empirical

60) 0.0932

61) 0.255

62) 0.342

63) 0.271

64) 0.254