

There are 33 questions. Select the letter of the most appropriate answer and shade in the corresponding region on the answer sheet.

Describe how you would structure a key word search to find the information described.

- 1) Articles that mention either wars or natural disasters (or both) that involved Belgium
- A) (wars AND natural disasters) AND Belgium B) (wars AND natural disasters) OR Belgium
C) (wars OR natural disasters) OR Belgium D) (wars OR natural disasters) AND Belgium
- 2) Articles about how World War II affected feminism in either the United States or Japan (or both)
- A) World War II OR feminism OR (United States OR Japan)
B) World War II AND feminism AND United States AND Japan
C) World War II AND feminism OR (United States AND Japan)
D) World War II AND feminism AND (United States OR Japan)

Evaluate the validity of the chain of conditionals.

- 3) Premise: If I pay my bills on time, then my credit will be good.
Premise: If my credit is good, then I will become a movie star.
Conclusion: If I pay my bills on time, then I will become a movie star.
- A) Valid B) Invalid
- 4) Premise: If you loved me, then you would buy me a new car.
Premise: If you wanted me to be happy, then you would buy me a new car.
Conclusion: If you loved me, then you would want me to be happy.
- A) Valid B) Invalid

Write the negation of the proposition.

- 5) No fifth graders play soccer.
- A) All fifth graders play soccer. B) At least one fifth grader plays soccer.
C) No fifth grader does not play soccer. D) Not all fifth graders play soccer.

Two statements are listed in which p , q , and r represent propositions. Are the two statements logically equivalent?

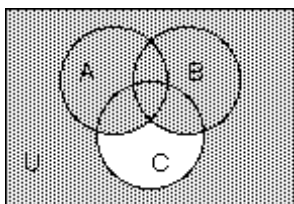
- 6) not (p or q); ($\text{not } p$) and ($\text{not } q$)
- A) No B) Yes
- 7) not (p and q); ($\text{not } p$) or q
- A) Yes B) No

Provide an appropriate response.

- 8) 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 green jelly beans?
- A) 29 B) 17 C) 37 D) 12
- 9) In a group of 42 students, 22 take history, 17 take biology and 8 take both history and biology. How many students take biology, but not history?
- A) 17 B) 5 C) 9 D) 22

Use set notation to identify the shaded region.

10)



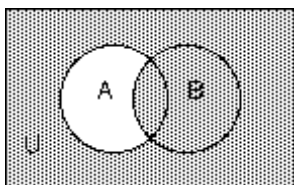
A) $(A \cap B) \cup \bar{C}$

B) $(A \cup B) \cup \bar{C}$

C) $\overline{A \cup B \cup C}$

D) $A \cup B \cap \bar{C}$

11)



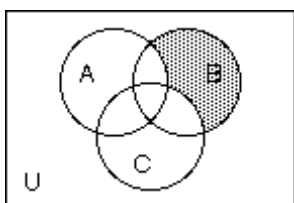
A) $\bar{A} \cup B$

B) $\bar{A} \cap B$

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

D) $B - A$

12)



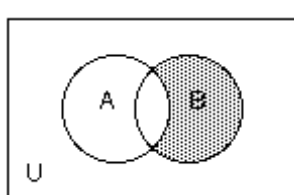
A) $B - (A \cap C)$

B) $\bar{B} - (A \cup B)$

C) $\bar{A} \cap \bar{C} \cap B$

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

13)



A) $B - \bar{A}$

B) $A - B$

C) $A \cap \bar{B}$

D) $B \cap \bar{A}$

Write a statement that represents the relationship between the following.

14) \emptyset and $B = \{a, b, c, d, e\}$

A) $\emptyset \subset B$

B) $\emptyset \in B$

C) $\emptyset = B$

D) $\emptyset \not\subset B$

15) $A = \{10, 11, 12\}$ and $B = \{x \mid 10 \leq x \leq 12, x \in \mathbb{N}\}$

A) $B \subset A$

B) $A \subset B$

C) $A \not\subset B$

D) $A \subseteq B$

16) $C = \{x \mid x \text{ is a letter of the alphabet}\}$ and $D = \{x \mid x \text{ is a letter in the word science}\}$

A) $D \subset C$

B) $D = C$

C) $C \not\subset D$

D) $D \not\subset C$

17) $M = \emptyset$ and $N = \{ \}$

A) $M \subset N$

B) $M = N$

C) $M \neq N$

D) $N \in M$

- 18) $A = \{x \mid x \text{ is a letter from the word "garage"}\}$ and $B = \{y \mid y \text{ is a letter from the word "rage"}\}$
 A) $A = B$ B) $A \subset B$ C) $A \in B$ D) $A \neq B$

Use sets to solve the problem.

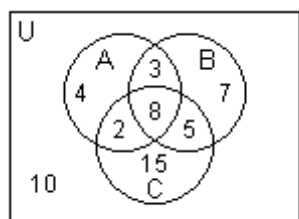
- 19) A survey of 300 families showed that

115 had a dog;
 88 had a cat;
 40 had a dog and a cat;
 112 had neither a cat nor a dog nor a parakeet;
 10 had a cat and dog and a parakeet.

How many had a parakeet only?

- A) 35 B) 30 C) 25 D) 40
- 20) 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?
 A) 250 B) 100 C) 150 D) 350

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



- 21) $n((A \cup B) \cap C)$
 A) 33 B) 15 C) 11 D) 14
- 22) $n(A)$
 A) 9 B) 17 C) 12 D) 4
- 23) $n(A \cap C)$
 A) 2 B) 37 C) 18 D) 10

Find the Cartesian product or cardinal number as requested.

- 24) Write $\{(e, m), (e, n), (f, m), (f, n)\}$ as a Cartesian product.
 A) $\{e, f\} \times \{m, n\}$ B) $\{e, m\} \times \{f, n\}$ C) $\{e, f, m, n\} \times \{1\}$ D) $\{m, n\} \times \{e, f\}$
- 25) $A = \{10, 2, 8\}$
 $B = \{6, 9\}$
 Find $A \times B$.
 A) $\{(10, 6), (2, 8), (8, 6)\}$ B) $\{(6, 10), (6, 2), (6, 8), (9, 10), (9, 2), (9, 8)\}$
 C) $\{(10, 6), (10, 9), (2, 6), (2, 9), (8, 6), (8, 9)\}$ D) $\{(10, 6), (2, 9)\}$

- 26) $n(A) = 27$
 $n(B) = 10$
 Find $n(A \times B)$.
 A) 270

B) 47

C) 37

D) 17

- 27) $n(A \times B) = 90$
 $n(A) = 9$
 Find $n(B)$.
 A) 10

B) 9

C) 99

D) 81

Make a truth table for the given statement. The letters p, q, r, s represent propositions.

- 28) r and not s

A)

| r | s | r and not s |
|---|---|-------------|
| T | T | F |
| T | F | T |
| F | T | F |
| F | F | F |

B)

| r | s | r and not s |
|---|---|-------------|
| T | T | T |
| T | F | T |
| F | T | F |
| F | F | T |

C)

| r | s | p and not s |
|---|---|-------------|
| T | T | F |
| T | F | T |
| F | T | F |
| F | F | F |

D)

| r | s | r and not s |
|---|---|-------------|
| T | T | T |
| T | F | F |
| F | T | F |
| F | F | F |

Write the converse, inverse, or contrapositive of the proposition, as indicated.

- 29) If you received a refund of over \$1000, then you cannot make a claim. (inverse)

- A) If you cannot make a claim, then you did not receive a refund of over \$1000.
 B) If you can make a claim, then you received a refund of over \$1000.
 C) If you did not receive a refund of over \$1000, then you can make a claim.
 D) If you can make a claim, then you did not receive a refund of over \$1000.

- 30) If the alarm beeps every thirty seconds, then you have to replace the battery. (converse)

- A) If you have to replace the battery, then the alarm does not beep every thirty seconds.
 B) If the alarm does not beep every thirty seconds, then you do not have to replace the battery.
 C) If you have to replace the battery, then the alarm beeps every thirty seconds.
 D) If you do not have to replace the battery, then the alarm does not beep every thirty seconds.

- 31) If I pass, then I'll celebrate. (contrapositive)

- A) If I don't pass, then I won't celebrate.
 B) If I pass, then I won't celebrate.
 C) If I don't celebrate, then I didn't pass.
 D) If I celebrate, then I'll pass.

Construct a truth table for the proposition.

- 32) $p \vee (p \wedge \sim p)$

A)

| p | $p \vee (p \wedge \sim p)$ |
|---|----------------------------|
| T | T |
| F | T |

B)

| p | $p \vee (p \wedge \sim p)$ |
|---|----------------------------|
| T | T |
| F | F |

C)

| p | $p \vee (p \wedge \sim p)$ |
|---|----------------------------|
| T | F |
| F | T |

D)

| p | $p \vee (p \wedge \sim p)$ |
|---|----------------------------|
| T | F |
| F | F |

- 33) $p \rightarrow \sim q$

A)

| p | q | $p \rightarrow \sim q$ |
|---|---|------------------------|
| T | T | F |
| T | F | F |
| F | T | T |
| F | F | T |

B)

| p | q | $p \rightarrow \sim q$ |
|---|---|------------------------|
| T | T | T |
| T | F | T |
| F | T | F |
| F | F | F |

C)

| p | q | $p \rightarrow \sim q$ |
|---|---|------------------------|
| T | T | F |
| T | F | T |
| F | T | T |
| F | F | T |

D)

| p | q | $p \rightarrow \sim q$ |
|---|---|------------------------|
| T | T | T |
| T | F | F |
| F | T | T |
| F | F | T |

Answer Key

Testname: LOGIC AND SET THEORY 16

- 1) D
- 2) D
- 3) A
- 4) B
- 5) B
- 6) B
- 7) B
- 8) D
- 9) C
- 10) B
- 11) A
- 12) C
- 13) D
- 14) A
- 15) D
- 16) A
- 17) B
- 18) A
- 19) C
- 20) D
- 21) B
- 22) B
- 23) D
- 24) A
- 25) C
- 26) A
- 27) A
- 28) A
- 29) C
- 30) C
- 31) C
- 32) B
- 33) C