1. Consider the diagram. Which statement is true if all regions are occupied?

![Venn Diagram](image)

a) Any element of A is an element of B.
b) Any element of B is an element of A.
c) Some element of A is an element of C.
d) None of the above.

2. Consider the diagram. Which statement is true if no region is empty?

![Venn Diagram](image)

a) No members of B are members of C.
b) No members of A are members of C.
c) Some members of B are members of C.
d) None of the above.

3. Select the rule that directly transforms statement i) into statement ii).

i) Not all pens are blue.
ii) Some pens are not blue.

a) “All are not p” into “Some are not p”.
b) “Not (not p)” into “p”.
c) “All are not p” into “None are p”.
d) “If p then q” into “If not q, then not p”.
4. Select the rule that directly transforms statement i) into statement ii).

   i) If it is a diamond, then it is small.
   ii) If it is not small, then it is not a diamond.

   a) “If p then q” into “If not p, then not q”.
   b) “If p then q” into “If q then p”.
   c) “If p then q” into “If not q, then not p”.
   d) None of the above.

5. Select the rule that directly transforms statement i) into statement ii).

   i) All grapes are not green.
   ii) No grape is green.

   a) “Not (not p)” into “ p”.
   b) “Not some p” into “All are not p”.
   c) “All are not p” into “None are p”.
   d) None of the above.

6. Select the rule that directly transforms statement i) into statement ii).

   i) It is not true that Jim speaks Spanish or English.
   ii) Jim does not speak Spanish and does not speak English

   a) “Not (p or q)” into “Not p and not q”.
   b) “Not (p and q)” into “Not p or not q”.
   c) “None are p” into “All are not p”.
   d) None of the above.

7. Negate: It is sunny or I am blind.

   a) It is not sunny or I am not blind.
   b) It is not sunny and I am not blind.
   c) If it is sunny, then I am blind.
   d) It is not sunny or I am blind.

8. Negate: Jack will study and he will pass the test.

   a) Jack will not study and he will not pass the test.
   b) Jack will study or he will pass the test.
   c) If Jack studies, then he will not pass the test.
   d) Jack will not study or he will not pass the test.
9. Find the negation of “If loving you is wrong, then I don’t want to be right.”
   a) Loving you is wrong and I want to be right.
   b) If loving you is not wrong, then I want to be right.
   c) If I want to be right, then loving you is not wrong.
   d) Loving you is not wrong or I want to be right.

10. Negate: All teachers are intelligent.
    a) Some teachers are intelligent.
    b) No teacher is intelligent.
    c) Some teachers are not intelligent.
    d) Every teacher is intelligent.

11. Negate: Some students are taking Algebra I.
    a) All students are taking Algebra I.
    b) Some students are not taking Algebra I.
    c) Not all students are not taking Algebra I.
    d) No students are taking Algebra I.

12. Find the negation of “No dogs have three legs.”
    a) Every dog has three legs.
    b) All dogs have three legs.
    c) Some dogs do not have three legs.
    d) Some dogs have three legs.

13. Negate: Some horses are not in the race.
    a) Some horses are in the race.
    b) All horses are in the race.
    c) No horse is in the race.
    d) None of the horses are in the race.

14. Select a statement that is logically equivalent to “If Jerry is tall, then Betty is short.”
    a) If Betty is short, then Jerry is tall.
    b) Jerry is tall and Betty is short.
    c) If Betty is not short, then Jerry is not tall.
    d) If Jerry is not tall, then Betty is short.
15. Select a statement that is logically equivalent to “If Florida is sunny, then Chicago is windy.”
   a) Florida is not sunny or Chicago is windy.
   b) If Chicago is windy, then Florida is sunny.
   c) If Florida is not sunny, then Chicago is not windy.
   d) Florida is not sunny and Chicago is windy.

16. Select the logical equivalent to “It is not true that I like mathematics and you like English.”
   a) I do not like mathematics or you do not like English.
   b) I like mathematics or you like English.
   c) If I like mathematics, then you like English.
   d) I do not like mathematics and you do not like English.

17. Select the logical equivalent to “It is not true that Bob sings or Jane dances.”
   a) Bob does not sing or Jane does not dance.
   b) Bob sings and Jane dances.
   c) If Jane dances, then Bob sings.
   d) Bob does not sing and Jane does not dance.

18. Select the statement that is logically equivalent to “It is not true that if it rains, it pours.”
   a) If it does not rain, then it does not pour.
   b) It rains and it does not pour.
   c) It does not rain and it does not pour.
   d) If it does not rain, then it pours.

19. Consider the following pair of statements and find a valid conclusion, if possible.
   i) No student likes homework.
   ii) All teaches like homework.
   a) Some students are teachers.
   b) No teachers are students.
   c) Some students like homework.
   d) None of the above.
20. Consider the following pair of statements and find a valid conclusion.

i) All dogs have tails.
ii) Bruno has a tail.

a) Some Brunos have a tail.
b) Bruno is a dog.
c) Some dogs have tails.
d) None of the above.

21. Consider the following pair of statements and find a valid conclusion.

i) All drivers have a license.
ii) Some drivers own a car.

a) All drivers own a car.
b) All licensed people drive.
c) Some licensed people who are not drivers own a car.
d) None of the above.

22. Select the conclusion to make the argument valid.
If I take the bus, then I will arrive late.
If I arrive late, then I will work more hours.

a) If I work more hours, then I will take the bus.
b) I take the bus or I will work more hours.
c) If I take the bus, then I will work more hours.
d) I take the bus and I arrive late.

23. Select the conclusion to make the argument valid.
I will go to the beach or to the movies.
I will not go to the movies.

a) I will not go to the beach.
b) I will go the beach and to the movies.
c) I will go to the movies.
d) I will go to the beach.
24. Consider the following pair of statements and find a valid conclusion.

i) If you practice, then you will succeed.
ii) You will not succeed.

a) You do not practice.
b) You practice.
c) You practice and you will succeed.
d) You do not practice or you succeed.

25. To qualify for a loan of $100,000, an applicant must have a gross income of $40,000 if single or $50,000 if married and the applicant(s) must have assets of at least $20,000. Read the requirements and each applicant’s qualifications for obtaining a $100,000 loan. Select the qualified applicant.

Mr. A and his wife have assets of $25,000. He makes $32,000 and she makes $23,000.

Mr. B is married with five children and makes $53,000. His wife is unemployed.

Miss C is single and works two jobs. She makes $28,000 on her day job and $13,000 on her night job. She has assets of $17,000.

a) Mr. A
b) Mr. B
c) Miss C
d) No one
Answers to CLAST-LIKE QUESTIONS 1.6

1. B  
2. A  
3. A  
4. C  
5. C  
6. A  
7. B  
8. D  
9. A  
10. C  
11. D  
12. D  
13. B  
14. C  
15. A  
16. A  
17. D  
18. B  
19. B  
20. D  
21. C  
22. C  
23. D  
24. A  
25. A

Explanations

1. **B** is a subset of **A**. Therefore, any element of **B** is an element of **A**.

2. **B** and **C** are disjoint. Therefore, no members of **B** are members of **C**.

3. Transferring to symbolic form: “Not all are p” implies “Some are not p”. The only similar choice is **a**.

4. Transferring to symbolic form: “If p then q” implies “If not q, then not p”.

5. Transferring to symbolic form: “All are not p” implies “None are p”.

6. Transferring to symbolic form: “Not ( p or q )” implies “Not p and not q”.

7. Recall: “p or q” negates to “not p and not q”. It is not sunny and I am not blind.

8. Recall: “p and q” negates to “not p or not q”. Jack will not study or he will not pass the test.

9. Recall: “if p then q” negates to “p and not q”. Loving you is wrong and I want to be right.

10. Recall: “All” negates to “Some are not”. Some teachers are not intelligent.

11. Recall: “Some are” negates to “None/No are”. No students are taking Algebra I.
12. Recall: “None are” negates to “Some are”. Some dogs have three legs.

13. Recall: “Some are not” negates to “All are”. All horses are in the race.

14. Recall: “If p then q” negates to “If not q, then not p”. If Betty is not short, then Jerry is not tall.

15. Recall: “If p then q” is equivalent to “Not p or q”. Florida is not sunny or Chicago is windy.

16. Recall: “Not (p and q)” is equivalent to “Not p or not q”. I do not like mathematics or you do not like English.

17. Recall: “Not (p or q)” is equivalent to “Not p and not q”. Bob does not sing and Jane does not dance.

18. Recall: “Not (if p then q)” is equivalent to “p and not q”. It rains and it does not pour.

19. From premise 1, we have two circles. Adding premise 2, we get

```
\[
\begin{array}{c}
S \quad H \\
\end{array}
\]
```

```
\[
\begin{array}{c}
S \quad T \\
H \\
\end{array}
\]
```

Conclusion: No teachers are students.
20. From premise 1, we get

Adding premise 2, we get

Bruno can be inside Circle D (dogs) and have a tail, Circle T.
Bruno can be outside Circle D (dogs) and have a tail, Circle T.
Bruno is not necessarily a dog, therefore no proper conclusion can be formed.

21. From premise 1, we get

Adding premise 2, we get

Conclusion: Some licensed people who are not drivers own a car.

22. In symbolic form: If p then q
If q then r
Therefore, If p then r. (Form 5)

Conclusion: If I take the bus, then I will work more hours.

23. In symbolic form: p or q
not q
Therefore, p. (Form 4)

Conclusion: I will go to the beach.
24. In symbolic form: If \( p \) then \( q \)
   \[
   \neg q
   \]
   Therefore, not \( p \). (Form 2)

   Conclusion: You do not practice.

25. Mr. A and his wife meet the criteria.

   \[
   \text{assets of } \$25,000 > \$20,000 \\
   \text{income} = 32,000 + 23,000 = 55,000
   \]

   Mr. B has no assets. Therefore, he does not meet the criteria.

   Miss C has assets of \$17,000 < \$20,000. She does not meet the criteria.

   Conclusion: The only qualified applicant is Mr. A.