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

Let p, q, r, and s represent the following statements:
p: One plays hard.
q: One is a guitar player.
r: The commute to work is not long.
s: It is not true that the car is working.

Express the following statement symbolically.

1) One does not play hard. 1) _____
A) ~p B) p C) ~q D) q

2) One is not a guitar player. 2) _____
A) p B) ~p C) q D) ~q

3) The commute to work is long. 3) _____
A) s B) ~s C) r D) ~r

4) The car is working. 4) _____
A) s B) ~r C) ~s D) r

Express the symbolic statement ~p in words.

5) p: The refrigerator is not working. 5) _____
A) The refrigerator is almost working.
B) The oven is working.
C) The refrigerator is working.
D) It is not true that the refrigerator is working.

Express the quantified statement in an equivalent way, that is, in a way that has exactly the same meaning.

6) Some mammals are cats. 6) _____
A) At least one mammal is a cat.
B) All cats are mammals.
C) No mammals are cats.
D) There exists at least one cat that is a mammal.

7) No politicians have told a lie. 7) _____
A) At least one politician has told a lie. B) All politicians have not told a lie.
C) All politicians have told a lie. D) Some politicians have told a lie.

Write the negation of the quantified statement. (The negation should begin with "all," "some," or "no.")

8) Some drinks are not liquids. 8) _____
A) All liquids are drinks. B) All drinks are liquids.
C) No drinks are liquids. D) All drinks are not liquids.

Given that p and q each represents a simple statement, write the indicated compound statement in its symbolic form.

9) p: Tosca is an opera. 9) _____
q: Carmen is an opera.
Tosca is an opera and Carmen is an opera.
A) $p \wedge \sim q$ B) $p \rightarrow q$ C) $p \vee q$ D) $p \wedge q$

10) p: Spartacus is a film. 10) _____
q: Rambo is a film.
Spartacus is a film and Rambo is not a film.
A) $p \wedge \sim q$ B) $p \vee \sim q$ C) $p \rightarrow \sim q$ D) $p \wedge q$

Given that p and q each represents a simple statement, write the indicated symbolic statement in words.

11) p: Emilio dislikes Laura 11) _____
q: Laura dislikes Emilio
$\sim (p \wedge q)$
A) Emilio dislikes Laura and Laura dislikes Emilio.
B) Emilio does not dislike Laura, but Laura dislikes Emilio.
C) It is not true that Emilio dislikes Laura and Laura dislikes Emilio.
D) Emilio dislikes Laura but Laura does not dislike Emilio.

12) p: The air freshener is working. 12) _____
q: The basement is smelly.
$p \nrightarrow \sim q$
A) If the air freshener is working then the basement is not smelly.
B) Either the air freshener is working or the basement is smelly.
C) If the air freshener is not working then the basement is smelly.
D) The air freshener is working if and only if the basement is not smelly.

13) p: The fan is working. 13) _____
q: The bedroom is stuffy.
$p \nleftrightarrow q$
A) The fan is working if and only if the bedroom is not stuffy.
B) The fan is working and the bedroom is not stuffy.
C) If the fan is working, then the bedroom is not stuffy.
D) The fan is not working if and only if the bedroom is not stuffy.

Complete the truth table by filling in the required columns.

14) $\sim p \vee p$ 14) _____

p	~ p	~ p ∨ p
T		
F		

A)

p	~ p	~ p ∨ p
T	F	T
F	F	F

B)

p	~ p	~ p ∨ p
T	F	T
F	T	T

C)

p	~ p	~ p ∨ p
T	T	T
F	F	T

D)

p	~ p	~ p ∨ p
T	F	F
F	T	F

Construct a truth table for the statement.

15) $\sim q \wedge \sim r$ 15) _____

A)

q	r	$(\sim q \wedge \sim r)$
T	T	T
T	F	F
F	T	F
F	F	T

B)

q	r	$(\sim q \wedge \sim r)$
T	T	F
T	F	F
F	T	F
F	F	T

C)

q	r	$(\sim q \wedge \sim r)$
T	T	F
T	F	T
F	T	T
F	F	T

D)

q	r	$(\sim q \wedge \sim r)$
T	T	F
T	F	F
F	T	F
F	F	F

Let p represent a true statement and let q represent a false statement. Find the truth value of the given compound statement.

16) $p \wedge q$ 16) _____

A) True B) False

17) $\sim p \vee q$ 17) _____

A) True B) False

18) $p \wedge (q \vee p)$ 18) _____

A) True B) False

Let p represent a true statement, while q and r represent false statements. Find the truth value of the compound statement.

19) $\sim p \vee (q \wedge \sim r)$ 19) _____

A) True B) False

20) $(p \wedge \sim q) \wedge r$ 20) _____

A) True B) False

21) $\sim[(\sim p \wedge q) \vee r]$ 21) _____

A) True B) False

Construct a truth table for the statement.

22) $\sim p \nrightarrow q$ 22) _____

A)

p	q	~ p	~ q	~ p $\nrightarrow$ q
T	T	F	F	T
T	F	F	T	F
F	T	T	F	F
F	F	T	T	T

B)

p	q	~ p	~ q	~ p $\nrightarrow$ q
T	T	F	F	F
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

C)

p	q	~ p	~ q	~ p $\nrightarrow$ q
T	T	F	T	T
T	F	F	F	T
F	T	T	T	T
F	F	T	F	F

D)

p	q	~ p	~ q	~ p $\nrightarrow$ q
T	T	F	F	T
T	F	F	T	T
F	T	T	F	F
F	F	T	T	T

Use a truth table to determine whether the two statements are equivalent.

23) $\sim p \wedge \sim q$ and $\sim(p \vee q)$ 23) _____

A) Yes B) No

24) $\sim p \vee \sim q$ and $\sim(p \wedge q)$ 24) _____

A) Yes B) No

25) $q \wedge \sim p$ and $\sim p \nrightarrow q$ 25) _____

A) Yes B) No

Write the converse and inverse of the statement.

26) If you drink too much coffee, then you get hyper. 26) _____

A) converse: If you get hyper, then you are drinking too much coffee.
inverse: If you don't get hyper, then you are not drinking too much coffee.

B) converse: If you don't drink too much coffee, you don't get hyper.
inverse: If you get hyper, then you are drinking too much coffee.

C) converse: If you get hyper, then you are drinking too much coffee.
inverse: If you don't get hyper, then you are drinking too much coffee.

D) converse: If you get hyper, then you are drinking too much coffee.
inverse: If you don't drink too much coffee, you don't get hyper.

Use De Morgan's laws to write a negation of the statement.

27) Cats are lazy or dogs aren't friendly. 27) _____

A) Cats are lazy and dogs are friendly. B) Cats aren't lazy and dogs are friendly.

C) Cats aren't lazy or dogs are friendly. D) Cats aren't lazy or dogs aren't friendly.

28) Roger or Emil will attend the game. 28) _____

A) Roger will not attend the game and Emil will attend the game.

B) Roger and Emil will attend the game.

C) Roger or Emil will not attend the game.

D) Roger will not attend the game and Emil will not attend the game.

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

Translate the argument into symbolic form, then use the table below to determine whether the argument is valid or invali
Indicate valid/invalid and identify the type of answer.

VALID ARGUMENTS

Direct Reasoning	Contrapositive Reasoning	Disjunctive Reasoning		Transitive Reasoning
$p \rightarrow q$	$p \rightarrow q$	$p \vee q$	$p \vee q$	$p \rightarrow q$
p	$\sim q$	$\sim p$	$\sim q$	$q \rightarrow r$
————	————	————	————	————
$\therefore q$	$\therefore \sim p$	$\therefore q$	$\therefore p$	$\therefore p \rightarrow q$ $\therefore \sim r \rightarrow \sim p$

INVALID ARGUMENTS

Fallacy of the Converse	Fallacy of the Inverse	Misuse of Disjunctive Reasoning		Misuse of Transitive Reasoning
$p \rightarrow q$	$p \rightarrow q$	$p \vee q$	$p \vee q$	$p \rightarrow q$
q	$\sim p$	p	q	$q \rightarrow r$
————	————	————	————	————
$\therefore p$	$\therefore \sim q$	$\therefore \sim q$	$\therefore \sim p$	$\therefore \quad r \rightarrow p$ $\therefore \sim p \rightarrow \sim r$

29) If Fred studies hard, then he gets a good grade. 29) _____
Fred got a good grade.
$\therefore$He studies hard.

30) We will lower the drinking age or we will require three photo IDs. 30) _____
We will not require three photo IDs.
$\therefore$We will lower the drinking age.

31) If I take a taxi, I will get to the museum faster. 31) _____
If I get to the museum faster, I will have more time to enjoy the paintings.
$\therefore$If I take a taxi, I will have more time to enjoy the paintings.