

Name _____

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

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

- 1) p: The fan is working.
q: The bedroom is stuffy.
 $\sim p \wedge q$
A) The fan is working and the bedroom is stuffy.
B) The fan is not working and the bedroom is stuffy.
C) If the bedroom is stuffy, then the fan is not working.
D) The fan is not working if and only if the bedroom is stuffy.

Use Euler diagrams to determine whether the argument is valid or invalid.

- 2) All multiples of 4 are multiples of 2.
Eleven is not a multiple of 2.

Therefore, eleven is not a multiple of 4.
A) valid

B) invalid

Let p, q, and r represent the statements:

p: It is not true that the radio is loud.

q: The radio is playing the news.

r: The radio is on.

- 3) Express the following statement symbolically:

The radio is not on.

A) r

B) q

C) $\sim r$

D) p

Construct a truth table for the statement.

- 4) $\sim(p \vee q) \wedge \sim p$

p	q	$p \vee q$	$\sim(p \vee q)$	$\sim p$	$\sim(p \vee q) \wedge \sim p$
T	T	T	F	F	F
T	F	T	F	F	F
F	T	T	F	T	F
F	F	F	T	T	T

p	q	$p \vee q$	$\sim(p \vee q)$	$\sim p$	$\sim(p \vee q) \wedge \sim p$
T	T	T	F	F	F
T	F	T	F	F	F
F	T	T	T	T	T
F	F	F	T	T	T

p	q	$p \vee q$	$\sim(p \vee q)$	$\sim p$	$\sim(p \vee q) \wedge \sim p$
T	T	T	F	F	F
T	F	T	F	F	F
F	T	T	F	T	T
F	F	F	T	T	T

p	q	$p \wedge q$	$\sim(p \vee q)$	$\sim p$	$\sim(p \wedge q) \wedge \sim p$
T	T	T	F	F	F
T	F	F	T	F	F
F	T	F	T	T	T
F	F	T	F	T	F

5) $\sim(q \vee t) \wedge \sim(t \wedge q)$

A) $\frac{q \quad t \quad \sim(q \vee t) \wedge \sim(t \wedge q)}{\quad \quad \quad}$

T	T	F
T	F	T
F	T	T
F	F	F

B) $\frac{q \quad t \quad \sim(q \vee t) \wedge \sim(t \wedge q)}{\quad \quad \quad}$

T	T	F
T	F	F
F	T	F
F	F	T

C) $\frac{q \quad t \quad \sim(q \vee t) \wedge \sim(t \wedge q)}{\quad \quad \quad}$

T	T	F
T	F	F
F	T	F
F	F	F

D) $\frac{q \quad t \quad \sim(q \vee t) \wedge \sim(t \wedge q)}{\quad \quad \quad}$

T	T	F
T	F	F
F	T	T
F	F	F

Construct a truth table for the given statement and then determine if the statement is a tautology.

6) $(\sim p \wedge q) \wedge (\sim p \vee q)$

A) $\frac{p \quad q \quad \sim p \quad \sim p \wedge q \quad \sim p \vee q \quad (\sim p \wedge q) \wedge (\sim p \vee q)}{\quad \quad \quad \quad \quad \quad \quad}$

T	T	F	F	T	T
T	F	F	F	F	F
F	T	T	T	T	T
F	F	T	F	T	T

Is not a tautology.

B) $\frac{p \quad q \quad \sim p \quad \sim p \wedge q \quad \sim p \vee q \quad (\sim p \wedge q) \wedge (\sim p \vee q)}{\quad \quad \quad \quad \quad \quad \quad}$

T	T	F	F	F	F
T	F	F	F	F	F
F	T	T	T	T	T
F	F	T	F	F	F

Is not a tautology.

C) $\frac{p \quad q \quad \sim p \quad \sim p \wedge q \quad \sim p \vee q \quad (\sim p \wedge q) \wedge (\sim p \vee q)}{\quad \quad \quad \quad \quad \quad \quad}$

T	T	F	F	T	F
T	F	F	F	F	F
F	T	T	T	T	T
F	F	T	F	T	F

Is not a tautology.

D) $\frac{p \quad q \quad \sim p \quad \sim p \wedge q \quad \sim p \vee q \quad (\sim p \wedge q) \wedge (\sim p \vee q)}{\quad \quad \quad \quad \quad \quad \quad}$

T	T	F	F	T	T
T	F	F	F	F	T
F	T	T	T	T	T
F	F	T	F	T	T

Is a tautology.

Complete the truth table by filling in the required columns.

7) $p \wedge \sim q$

p	q	$\sim q$	$p \wedge \sim q$
T	T		
T	F		
F	T		
F	F		

A)

p	q	$\sim q$	$p \wedge \sim q$
T	T	F	F
T	F	T	T
F	T	T	F
F	F	T	F

B)

p	q	$\sim q$	$p \wedge \sim q$
T	T	F	T
T	F	T	T
F	T	F	F
F	F	T	F

C)

p	q	$\sim q$	$p \wedge \sim q$
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	F

D)

p	q	$\sim q$	$p \wedge \sim q$
T	T	F	F
T	F	T	T
F	T	F	F
F	F	T	T

Write the negation of the conditional statement.

8) If she can't water the lawn, I will.

A) She can't water the lawn, I can't.

B) She can water the lawn, and I can't.

C) She can't water the lawn, and I won't.

D) If she can water the lawn, I can't.

Determine whether the sentence is a statement.

9) The orbit of Saturn lies completely within the orbit of Venus.

A) not a statement

B) statement

Write the equivalent contrapositive of the statement.

10) If he is not working in Malaysia, then he is vacationing in Japan.

A) If he is vacationing in Malaysia, then he is not working in Japan.

B) If he is working in Malaysia, then he is not vacationing in Japan.

C) If he is not vacationing in Japan, then he is working in Malaysia.

D) If he is not vacationing in Malaysia, then he is working in Japan.