

1. Write a negation for the statement  $13x + 6y < 13$ .

- a)  $13 > 13x + 6y$
- b)  $13x + 6y > 6$
- c)  $13x + 6y \leq 13$
- d)  $13x + 6y \geq 13$

2. Let  $p$  represent the statement "Her name is Lisa" and let  $q$  represent the statement "She lives in Chicago." Translate the symbolic statement " $\sim p$ " into words.

- a) It is true that her name is Lisa.
- b) Her name is not Lisa.
- c) She does not live in Chicago.
- d) Her name is Lisa.

3. Let  $p$  represent the statement "Jim plays football" and let  $q$  represent the statement "Michael plays basketball." Convert the compound statement into symbols: Jim does not play football or Michael does not play basketball.

- a)  $\sim (p \vee q)$
- b)  $\sim p \wedge \sim q$
- c)  $\sim p \vee \sim q$
- d)  $p \wedge q$

4. Give the number of rows needed in the truth table for the compound statement

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

- a) 4
- b) 8
- c) 9
- d) 3

5. Use one of De Morgan's laws to write the negation of the statement: "Cats are lazy or dogs aren't friendly."

- a) Cats aren't lazy and dogs are friendly.
- b) Cats aren't lazy or dogs aren't friendly.
- c) Cats aren't lazy or dogs are friendly.
- d) Cats are lazy and dogs are friendly.

6. Construct a truth table for the compound statement:  $\sim q \wedge \sim p$ .

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

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

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

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

7. Let  $p$  represent "The puppy behaves well," let  $q$  represent "The puppy's owners are happy," and let  $r$  represent "The puppy is trained." Express the compound statement  $r \wedge (p \rightarrow q)$  in words.

- a) If the puppy is trained then the puppy behaves well, and the puppy's owners are happy.
- b) The puppy is trained if the puppy behaves well and the puppy's owners are happy.
- c) The puppy is trained, or if the puppy behaves well then the puppy's owners are happy.
- d) The puppy is trained, and if the puppy behaves well then the puppy's owners are happy.

8. Let  $p$  represent "I eat too much," let  $q$  represent "I exercise," and let  $r$  represent "The food is good". Write the following compound statement in symbols: "If the food is good and I eat too much, then I exercise."

- a)  $p \rightarrow (r \wedge q)$
- b)  $(r \wedge p) \rightarrow q$
- c)  $r \rightarrow (p \wedge q)$
- d)  $r \wedge (p \rightarrow q)$

9. Write the following statement as an equivalent statement that does not use the if...then connective. Remember that  $p \rightarrow q$  is equivalent to  $\sim p \vee q$ . "If the sun comes out tomorrow, the flowers will open."

- a) The sun does not come out tomorrow or the flowers will open.
- b) The sun does not come out tomorrow or the flowers will not open.
- c) The sun comes out tomorrow and the flowers will not open.
- d) The sun does not come out tomorrow and the flowers will not open.

10. Rewrite the following statement, replacing the "if...then" statement with an equivalent "or" statement: "If you are human, then you were born on earth."

- a) You are human or you were born on earth.
- b) You are not human or you were not born on earth.
- c) You are human or you were not born on earth.
- d) You are not human or you were born on earth.

11. For the given direct statement, write the converse statement: "If you are like me, then I like you."

- a) I like you if you don't like me.
- b) If I don't like you, then you don't like me.
- c) If you don't like me, then I don't like you.
- d) If I like you, then you like me.

12. For the statement  $\sim q \rightarrow \sim p$ , write the contrapositive statement.

- a)  $q \rightarrow p$
- b)  $\sim (p \rightarrow q)$
- c)  $p \rightarrow q$
- d)  $\sim (q \rightarrow p)$

13. Write the statement in the form "if  $p$ , then  $q$ ": I will lose weight if I diet.

- a) If I don't diet, then I won't lose weight.
- b) If I lose weight, then I will diet.
- c) If I diet, then I will lose weight.
- d) If I diet, then I gain weight.

14. Decide whether the argument is valid or invalid, and give the form (of valid or invalid argument) that applies:

$$\frac{\begin{array}{l} \text{If you eat well, you will be well.} \\ \text{If you are well, you will be happy.} \end{array}}{\text{If you eat well, you will be happy.}}$$

- a) Invalid; fallacy of the converse
- b) Valid; reasoning by transitivity
- c) Valid; modus tollens
- d) Invalid; fallacy of the inverse

15. Determine whether the argument is valid or invalid.

$$\frac{\begin{array}{l} p \rightarrow q \\ q \end{array}}{p}$$

- a) Invalid
- b) Valid
- c) Neither
- d) Cannot be determined

16. Determine whether the argument is valid or invalid: If Cathy is a gambler, then she lives in Marine. If Cathy lives in Marine, then she loves horses. Therefore, if Cathy does not love horses, then she is not a gambler.

- a) Invalid
- b) Valid
- c) Neither
- d) Cannot be determined

17. Use the premises to give a conclusion that yields a valid argument: If it's not Saturday, then Dad shaved. If Dad has whiskers, then he did not shave. If it's Saturday, then Dad will take us to the game.

- a) If Dad shaved, then it's not Saturday.
- b) If Dad has whiskers, then he will take us to the game.
- c) If Dad did not shave, then he has whiskers.
- d) If Dad takes us to the game, then he has whiskers.

18. Write the following statement symbolically: "Some lights are green." [ $l(x)$  means "x is light" and  $g(x)$  means "x is green".]

- a)  $\forall x[l(x) \rightarrow g(x)]$
- b)  $\exists x[l(x) \rightarrow g(x)]$
- c)  $\exists x[l(x) \wedge g(x)]$
- d)  $\forall x[l(x) \wedge g(x)]$

19. Write the negation of the statement:  $\exists x[m(x) \wedge n(x)]$ .

- a)  $\forall x[\sim m(x) \rightarrow n(x)]$
- b)  $\forall x[m(x) \rightarrow \sim n(x)]$
- c)  $\exists x[m(x) \rightarrow \sim n(x)]$
- d)  $\exists x[\sim m(x) \rightarrow n(x)]$

20. The argument has a true conclusion. Identify the argument as valid or invalid.

$\sqrt{18}$  is less than 18.  
9 is less than 18.  
 $\sqrt{18}$  is less than 9.

- a) Invalid
- b) Valid
- c) Neither
- d) Not enough information to decide

2/21/07

MATH 017

1 - EX1

ITEM NO.	FORM:	A
1		D
2		B
3		C
4		B
5		A
6		C
7		D
8		B
9		A
10		D
11		D
12		C
13		C
14		B
15		A
16		B
17		B
18		C
19		B
20		A