

Name: \_\_\_\_\_

Block: \_\_\_\_\_ Date: \_\_\_\_\_

### **3.1 Statements and Logical Connectives**

#### **Classwork Part I**

1. Write the general form of the negation for statements of the form

- a. none are
- b. some are not
- c. all are
- d. some are

**Indicate whether the statement is a simple statement or a compound statement. If it is a compound statement, indicate whether it is a negation, conjunction, disjunction, conditional or bi-conditional by using both the word and its appropriate symbol.**

- 2. The sun is shining and the air is crisp.
- 3. The figure is a quadrilateral if and only if it has four sides.
- 4. Joni Burnette is teaching calculus or she is teaching trigonometry.
- 5. The hurricane did \$400,000 worth of damage to DeSoto County.

**Write the negation of the statement.**

- 6. Some picnic tables are portable.
- 7. All chickens fly.
- 8. No bicycles have three wheels.

**Write the statement in symbolic form. Let**      $p$  : The charcoal is hot.                       $q$ : The chicken is on the grill.

- 9. If the chicken is not on the grill then the charcoal is not hot.
- 10. The chicken is not on the grill if and only if the charcoal is not hot.
- 11. Neither is the charcoal hot nor is the chicken on the grill.

**Write the compound statement in words. Let**      $p$  : Firemen work hard.      $q$ : Firemen wear red suspenders.

12.  $\sim p$

13.  $q \vee p$

14.  $\sim p \leftrightarrow \sim q$

15.  $\sim (q \vee p)$

16. List the connectives used in this section.

**Define the following terms:**

17. simple statement:

18. compound statement:

19. conjunction:

20. disjunction:

21. conditional:

22. biconditional:

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### 3.1 Statements and Logical Connectives

#### Classwork Part II

**Write the statements in symbolic form.**

Let  $p$ : The temperature is 90°.

$q$ : The air conditioner is working.

$r$ : The apartment is hot.

1. If the temperature is 90° or the air conditioner is not working, then the apartment is hot.
2. The temperature is 90° and the air conditioner is working, or the apartment is hot.
3. The apartment is hot if and only if the temperature is not 90°, or the air conditioner is not working.

**Write each symbolic statement in words.**

Let  $p$ : The water is 70°.

$q$ : The sun is shining.

$r$ : We go swimming.

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

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

6.  $\sim r \rightarrow (q \wedge p)$

7.  $(q \rightarrow r) \wedge p$

8.  $(q \leftrightarrow p) \wedge r$

Use the information from the following menu to arrive at your answers. Many restaurant dinner menus include statements such as the following.

“All dinners are served with a choice of: Soup or Salad, and Potatoes or Pasta, and Carrots or Peas.”

Which of the following selections are permissible? If a selection is not permissible, explain why. See the discussion of the exclusive or on page 93 if needed.

9. Soup, salad, and peas

10. Salad, pasta, and carrots

**(a) Select letters to represent the simple statements and write each statement symbolically by using parentheses and**

**(b) indicate whether the statement is a negation, conjunction, disjunction, conditional, or biconditional.**

11. Ruth Bignel retired, but she did not start her concrete business.

12. It is false that if your speed is below the speed limit then you will not get pulled over.