

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

Course and Year: \_\_\_\_\_

**Part 1.** Give the truth value of each statement if  $t$  is true. Write T or F after the statement.

1.  $\sim p \rightarrow t$

4.  $p \wedge \sim t$

2.  $\sim p \vee t$

5.  $\sim (p \rightarrow t)$

3.  $p \rightarrow (t \vee \sim p)$

**Part 2.** Give the truth value of each sentence. Write T or F after the sentence.

1.  $p \wedge q$  if  $q$  is not true.

4.  $p \rightarrow (q \vee \sim r)$  if  $r$  is false.

2.  $p \rightarrow (p \vee q)$  if  $p$  is true.

5.  $p \rightarrow q$  if  $\sim (p \wedge q)$  is false.

3.  $(\sim p \vee r) \vee (q \rightarrow s)$  if  $q$  is false.

**Part 3.** Find the truth value of each symbolic statement. Show your solution

1. Let  $p$  be true,  $q$  be false and  $r$  be true.

a.  $r \rightarrow (p \rightarrow q)$

b.  $\sim [(p \wedge q) \rightarrow (r \leftrightarrow q)]$

2. Let  $p$  be true,  $q$  be false and  $r$  be false.

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

b.  $\sim [(\sim q \wedge p) \leftrightarrow r] \rightarrow q$

c.  $(\sim p \leftrightarrow \sim r) \vee [p \rightarrow (q \rightarrow r)]$

**Part 4.** Determine whether the statement is a tautology, a contradiction or indeterminate. Use a truth table to show your answer.

a.  $\sim q \vee (p \rightarrow q)$

b.  $p \rightarrow [(\sim q \rightarrow p) \wedge (q \vee \sim p)]$

c.  $(p \wedge q) \wedge (q \rightarrow \sim p)$

**Part 5.** Determine the relation between the two statements. Use a truth table to show your answer.

a.  $(p \wedge q) \rightarrow (p \vee q)$

b.  $(p \wedge \sim q) \leftrightarrow (p \rightarrow q)$

**Part 6.** Write the converse, inverse and contrapositive of “If  $n^2$  is even, then  $n$  is even.”

**Part 7.** Give the Rules of Replacement and the Rules of Inference.

**Part 8.**