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

**Geometry, Mrs. Sulkes**

**September 14th, 2012**

**Logic - Practice with Truth Tables**

1. Construct truth tables for the following. State if they are tautologies or contradictions.
2. 
3. 
4. P: Mark stays up late at night.

Q: Mark is tired in the morning.

1. Write the symbolic form of the sentence “If Mark stays up late at night, then he is tired in the morning.”
2. Write the symbolic form of the sentence “If Mark is not tired in the morning, then he did not stay up late at night.”
3. Are statements a and b logically equivalent? Support your answer with a truth table and explanation.
4. True or false? If false, explain why.
5. If a conditional state is true, then its converse is true.
6. If a sentence is a contradiction, then its negation is a tautology.
7. If two conditional statements are logically equivalent, then they are tautologies.
8. The converse of statement c is true.
9. The contrapositive of state c is true.
10. The biconditional of statement c is true.
11. Complete the true tables below and indicate if the statement is or is not a tautology.

|  |  |  |  |
| --- | --- | --- | --- |
| P | ~P | ~(~P) |  |
| T |  |  |  |
| F |  |  |  |

b.

|  |  |  |  |
| --- | --- | --- | --- |
| P | ~P |  |  |
| T |  |  |  |
| F |  |  |  |

c.

|  |  |  |  |
| --- | --- | --- | --- |
| P | ~P |  |  |
| T |  |  |  |
| F |  |  |  |

d.

|  |  |  |
| --- | --- | --- |
| Q | ~Q |  |
| T |  |  |
| F |  |  |

e.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q | ~P |  |  |
| T | T |  |  |  |
| T | F |  |  |  |
| F | T |  |  |  |
| F | F |  |  |  |

f.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| P | Q |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

h.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| P | Q | ~Q |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |

1. Verify each sentence is a tautology by constructing a truth table.
2. 
3. 
4. 
5. Construct a truth table for : 