THE NEGATION OF A STATEMENT MUST HAVE THE OPPOSITE TRUTH VALUE OF THE ORIGINAL STATEMENT.

A. REVIEW: To negate a simple statement use "not"

   Given: Chad is a Chipola student. (true)
   The negation is: Chad is not a Chipola student. (false)
   Or Given: Rose is not a Chipola student. (true)
   The negation is: Rose is a Chipola student. (false).

B. REVIEW: To negate a statement with a quantifier use the "box"

   All are   None are
   Some are   Some are not

   Ex: Given: Some movies are comedies. (True)
   The negation is: No movies are comedies. (False)

C. To negate a conjunction or disjunction simplify "it is false that" with DeMorgan's Laws.

   Given: p \land q    p \lor q
   The negation is  \neg(p \land q)    \neg(p \lor q)
   And is simplified to \neg p \lor \neg q    \neg p \land \neg q

   Ex - Given: I like carrots and I like celery. (true)
   Negation is: I do not like carrots or I do not like celery. (false)

   Ex - Given: The movie is a comedy or it is a drama. (true)
   Negation: The movie is not a comedy and it is not a drama. (false)

D. The negation of a conditional (p \rightarrow q) is \neg(p \rightarrow q) which simplifies to p \land \neg q.

   Ex: If you buy a ticket, then you go to the concert.
   Negation: You buy a ticket, and you do not go to the concert.

   Make a truth table to verify that these two statements have opposite truth values.

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>\neg(p \rightarrow q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
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<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p \land \neg q</th>
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<tr>
<td>T</td>
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E. Use these rules to negate the following symbolic statements:

   1. p \lor q    2. p \land q    3. p \rightarrow q    4. p \land \neg q
   5. p \rightarrow \neg q    6. \neg p \lor q    7. \neg p \rightarrow q    8. p \rightarrow (q \lor r)
F. Use these rules to negate the following sentences:
   Simple statements – add or delete "not"
   Conjunction or Disjunction – DeMorgan's Laws
   Conditional – hypothesis and not conclusion
   Quantifiers – Use the box

1. Her birthday is July 4 or it's July 5th.
2. Matt likes to draw and he likes to play soccer.
3. My favorite subject is Math.
4. My favorite is not Science.
5. If Jane studies, she will make an A.
6. If it rains, then I will not go to the beach.
7. Zachary plays ball or he will not stay outside.
8. Some Chipola students perform in plays.
9. All Chipola students take English but some Chipola students do not take Math.
10. If Kate does not take a humanities course, then she will take art.

G. Application: De Morgan's Laws can be used to determine if two statements are logically equivalent.

   1. \(~(~p \lor q)\)  \(p \land q\)  \(\sim(p \land \sim q)\)
   2. \(~p \lor q\)  \(\sim(p \land q)\)

Homework: Section 3.4 Problems 9, 11, 13, 17 and the following:

Negate the following statements.
1. Hank stayed for dinner and he waited for dessert.
2. Kim will study French or she will study Spanish.
3. If Jane has a cold, she will not go swimming.
4. At least one apple is ripe.
5. If the dress goes on sale, then I will buy it.
6. Rick will learn his part or he cannot be in the play.
7. I am not ready to go and I will stay home.
8. He does not like broccoli.
9. It is thundering and it is lightening.
10. If the air fares are cheap, then I will fly to New York.
11. He always has his hair cut on Saturday.
12. I will stay in Florida this summer and I will not go to Maine.
14. Tim will not swim and he will not water ski.
15. If Scott does not play tennis, then he will play golf.