MGF 1106 - CHAPTER THREE TEST
Name: Key

Fall 2002

1 - 5. Use the statements below to translate symbolic sentences into words and English sentences into symbols.

p: The book is fiction
q: The record is jazz
r: The movie is a comedy

1. The book is not fiction and the movie is a comedy.
\sim p \land r

2. It is false that the movie is a comedy and the book is fiction.
\sim (r \land p)

3. If the record is jazz, then the book is fiction and the movie is a comedy.
q \rightarrow (p \land r)

4. p \lor \sim r

Book or not comedy

5. q \land (p \lor r)

Record and book or comedy.

6 - 7. Determine the truth value of the following statements given that p is true, q is false, and r is false.

6. p \land \sim (p \lor \sim r)

<table>
<thead>
<tr>
<th>p</th>
<th>\sim r</th>
<th>p \lor \sim r</th>
<th>\sim (p \lor \sim r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>F</td>
<td>T</td>
<td>F</td>
</tr>
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</table>

7. p \rightarrow (\sim r \land \sim q)

<table>
<thead>
<tr>
<th>p</th>
<th>\sim r</th>
<th>\sim q</th>
<th>\sim r \land \sim q</th>
<th>p \rightarrow (\sim r \land \sim q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
<td>F</td>
<td>T</td>
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</table>

8 and 9. Complete the truth tables:

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>(p \lor q) \leftrightarrow (p \land q)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
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<tr>
<td>T</td>
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<td>F</td>
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<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>\sim p \land (p \lor q)</th>
</tr>
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<tbody>
<tr>
<td>T</td>
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10 – 13. Given the statement: If it is snowing then we will ski. Identify the following as converse, inverse or contra-positive

- **Converse**
  10. If we ski then it is snowing.

- **Inverse**
  11. If we will not ski then it is not snowing.

- **Contra-positive**
  12. If it is not snowing then we will not ski.

13. Which problem above (10 – 12) contains a statement that is logically equivalent to the original statement?

14 – 16. Give the NEGATION of the following statements.

14. If I go swimming then I will get wet.
   
   \[ \neg (I \text{ go swimming}) \land \neg (I \text{ do not get wet}) \]

15. All ducks swim.
   
   \[ \neg \exists x (x \text{ is a duck} \land x \text{ does not swim}) \]

16. I go swimming and I get wet.
   
   \[ \neg \text{swim} \lor \neg \text{wet} \]

17 – 18. Give a statement that is LOGICALLY EQUIVALENT to the following:

17. If the air conditioner is set too low then the overhead will not work.
   
   \[ \neg \exists x (x \text{ works} \land \neg x \text{ is set too low}) \]

18. It is false that some markers will not write.
   
   \[ \forall x (x \text{ marker} \implies x \text{ writes}) \]
19 – 25. Select the conclusion that is valid based on the premises given if possible.

19. If I like biscuits then I like gravy. If I like gravy then I like rice. Therefore,
   a. I like biscuits and I like rice.  b. I like biscuits or I like rice.
   c. If I like biscuits then I like rice.  d. If I do not like biscuits then I like gravy.
   e. No conclusion is possible.

20. I like biscuits or I like gravy. I do not like gravy. Therefore,
   a. I like biscuits.  b. I do not like biscuits.
   c. If I like biscuits then I like gravy.  d. If I like gravy then I like biscuits.
   e. No conclusion is possible.

21. If I like biscuits then I like gravy. I do not like gravy. Therefore,
   a. I like biscuits.  b. I do not like biscuits.
   c. If I do not like biscuits then I do not like gravy.  d. If I like gravy then I like biscuits.
   e. No conclusion is possible.

22. If I like biscuits then I like gravy. I do not like biscuits. Therefore,
   a. I like gravy.  b. I do not like gravy.
   c. I like biscuits.  d. I like biscuits and I do not like gravy.
   e. No conclusion is possible.

23. All roses are red. Some roses have thorns. Therefore,
   a. All red things are roses.  b. All red things have thorns.
   c. Some things with thorns are red.  d. Some roses are not red.
   e. No conclusion is possible.

24. All roses are red. All red things have thorns. Therefore,
   a. All red things are roses.  b. All things with thorns are red.
   c. All roses have thorns.  d. All things with thorns are roses.
   e. No conclusion is possible.

25. No roses are vegetables. All cucumbers are vegetables. Therefore,
   a. All roses are vegetables.  b. All cucumbers are roses.
   c. No cucumbers are roses.  d. Some cucumbers are roses.
   e. No conclusion is possible.