Class Time: TR 8-9:15am in Shelby Hall 2119 (3 credit hours)
Instructor: Mrs. Sheila Bolerjack
Office Hours: TR 1-3pm BY APPOINTMENT, in ILB 474
E-mail, Phone: srbolerjack@southalabama.edu; 251-709-0251 (cell), 460-7349 (office), 460-6264 (ILB 325)


Prerequisites: Two years of high school algebra (I & II), a year of geometry, and an ACT Math score of at least 20 or a score on the new placement test of at least 70.

Course Description and Objectives:
This course is intended to give an overview of topics in finite mathematics together with their applications. The course includes logic, sets, counting, permutations, combinations, basic probability, descriptive statistics, and their applications. The purpose of the course is to give a survey of mathematical analysis techniques used in the working world. This course gives valuable experience at organizing information and then analyzing it. The course format is lecturing.

Exams:
Four chapter tests and a final exam. The lowest chapter test grade will be dropped.

Homework, Quizzes:
Homework will be collected. Quizzes will be given.

Make-Up Policy:
If you miss a test, contact the instructor immediately. Usually, a grade of zero will be assigned and it will be the dropped grade. If you miss two tests your grade is F for the course. No make-up quizzes will be given and no late homework is accepted — unless you have a university approved excuse for being absent.

Attendance:
If you have more than 4 unexcused absences, your grade is F for the course.

Grading Policy:
By the end of the semester you will have a percentage for each of three tests, for the final, for the homework, and for the quizzes. Your overall percentage will be the arithmetic average of these six percentages. Your overall percentage will be converted to letter grade as follows:

\[
\begin{align*}
[90,100] & \rightarrow A, [80,90] & \rightarrow B, [70,80] & \rightarrow C, [60,70] & \rightarrow D, [0,60] & \rightarrow F.
\end{align*}
\]

Math Lab:
Free tutoring is available in ILB 235.

Withdrawal:
Friday, April 5th, 2013, 4:59pm, is the last day to withdraw from the course with a grade W or to change enrollment from credit to audit.

JagAlert:
JagAlert is an academic program intended to help students be successful in 100 and 200 level courses. You may receive an email instructing you to see your professor and/or academic advisor. Watch for the JagAlert email on February 20th, 2013.

Remarks:
If you have a specific disability that qualifies you for academic accommodation, please notify the instructor and provide certification from the Office of Special Student Services.

(OSS is located at 5828 Old Shell Rd. The phone number is 251-460-7212.)

Please note that all written and web materials for this course have an implied copyright.

The requirements and policies may be modified as circumstances dictate. 24 hour notice will be provided to the students in class and/or via email.

USA’s policy regarding Academic Disruption and regarding Student Academic Conduct Policy is published annually in The Lowdown. Disruptive academic behavior will not be tolerated. This includes, but is not limited to: using any electronic device other than a calculator, sleeping or reading in class, routinely entering class late or exiting early, packing up early, dominating class discussion, exhibiting grotesque physical habits, forgery, cheating/academic dishonesty. Note that academic dishonesty is a serious offense and will be treated as such. The instructor will take appropriate action including filing a report for the student’s Academic Misconduct Penalty Record, which may result in permanent dismissal from the University. There is zero tolerance for disruptive behavior. For the benefit of the whole, disruptors will be excused from the classroom and marked absent.
Class Time: T R 11am-12:15pm in Shelby Hall 2119 (3 credit hours)  
Instructor: Mrs. Sheila Boljerack  
Office Hours: T R 1-3pm BY APPOINTMENT, in ILB 474  
E-mail, Phone: srboljerack@southalabama.edu; 251-709-0251 (cell), 460-7349 (office), 460-6264 (ILB 325)  
Prerequisites: Two years of high school algebra (I & II), a year of geometry, and an ACT Math score of at least 20 or a score on the new placement test of at least 70.  
Course Description And Objectives: This course is intended to give an overview of topics in finite mathematics together with their applications. The course includes logic, sets, counting, permutations, combinations, basic probability, descriptive statistics, and their applications. The purpose of the course is to give a survey of mathematical analysis techniques used in the working world. This course gives valuable experience at organizing information and then analyzing it. The course format is lecturing.  
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Attendance: If you have more than 4 unexcused absences, your grade is F for the course.  
Grading Policy: By the end of the semester you will have a percentage for each of three tests, for the final, for the homework, and for the quizzes. Your overall percentage will be the arithmetic average of these six percentages. Your overall percentage will be converted to letter grade as follows:  

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>[90,100]</td>
<td>A</td>
</tr>
<tr>
<td>[80,90)</td>
<td>B</td>
</tr>
<tr>
<td>[70,80)</td>
<td>C</td>
</tr>
<tr>
<td>[60,70)</td>
<td>D</td>
</tr>
<tr>
<td>[0,60)</td>
<td>F</td>
</tr>
</tbody>
</table>

Math Lab: Free tutoring is available in ILB 235.  
Withdrawal: Friday, April 5th, 2013, 4:59pm, is the last day to withdraw from the course with a grade W or to change enrollment from credit to audit.  
JagAlert: JagAlert is an academic program intended to help students be successful in 100 and 200 level courses. You may receive an email instructing you to see your professor and/or academic advisor. Watch for the JagAlert email on February 26th, 2013.  
Remarks: If you have a specific disability that qualifies you for academic accommodation, please notify the instructor and provide certification from the Office of Special Student Services. (OSS is located at 5828 Old Shell Rd. The phone number is 251-460-7212.) 

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<table>
<thead>
<tr>
<th>Class Item</th>
<th>Homework Item; do ODDS unless noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/15 Course Introduction &amp; Activity</td>
<td>Read 1.1-1.3 (omit 8 row truth tables)</td>
</tr>
<tr>
<td></td>
<td>Print Chapter 1 Notesheets/Forms</td>
</tr>
<tr>
<td>1/17 1.1 Deductive vs. Inductive Reasoning</td>
<td>5-9, 15-35</td>
</tr>
<tr>
<td>1/22 1.2 Symbolic Logic</td>
<td>5-9 (omitting 7ef &amp; 9ef), 15&amp;17, 29-35</td>
</tr>
<tr>
<td>1/24 1.3 Truth Tables</td>
<td>Complete notesheets as possible</td>
</tr>
<tr>
<td>1/29 1.3 Truth Tables cont’d</td>
<td>1-5, 11, 23-27, 43&amp;45, 49</td>
</tr>
<tr>
<td>1/31 Review</td>
<td>Chapter Review: p63-66: terms, 1-20all (omit 10, 14ef, 15ef, 16bd) 26-28all, 39a-d all, 44-46all. Also see 1.3 handouts.</td>
</tr>
<tr>
<td>2/5 Chapter 1 Test</td>
<td>Read 2.1-2.4 &amp; Print Chapter 2 Notesheets/Forms</td>
</tr>
<tr>
<td>2/7 2.1a Sets and Operations</td>
<td>2, 3-25</td>
</tr>
<tr>
<td>2/12 MARDI GRAS HOLIDAY – NO CLASSES AT USA</td>
<td></td>
</tr>
<tr>
<td>2/14 2.1b Sets and Operations cont’d (Cardinal Number Formulae)</td>
<td>27, 37-49</td>
</tr>
<tr>
<td>2/19 2.2 Applications of Venn Diagrams</td>
<td>1-5, 11&amp;13, 23-33</td>
</tr>
<tr>
<td>2/21 2.3 Introduction to Combinatorics</td>
<td>1-11, 19, 21, 33-37</td>
</tr>
<tr>
<td>2/26 2.4 Permutations and Combinations</td>
<td>1-35 (omitting 9, 11, 31)</td>
</tr>
<tr>
<td>2/28 Review</td>
<td>Ch. Rev.: p128-130: terms, 1-29all (omit 13, 15, 16)</td>
</tr>
<tr>
<td>3/5 Chapter 2 Test</td>
<td>Read 3.1-3.5 &amp; Print Chapter 3 Notesheets/Forms</td>
</tr>
</tbody>
</table>

**NOTE:** For Ch 3, find the probability of an event occurring, not the odds of an event occurring

| 3/7 3.1 History of Probability → → NO exercises for 3.1                  |
|     3.2 Basic Terms of Probability →                                    |
|     1&2, 3-9, 17-21, 27, 39, 42, 62, 63, 69                              |

3/12 & 3/14 SPRING BREAK 3/11-3/17: NO CLASSES AT USA
3/19  3.3 Basic Rules of Probability
3/21  3.4 Combinatorics and Probability
3/26  3.5 Expected Value
3/28  In-class Review
4/2   Review
4/4   Chapter 3 Test

1-5, 11&13, 19&21, 39&41, 43-55, 59, 63
7&9, 21a, 23-27, 31
13-17, 39a&b

Complete the In-class Review by Tuesday, 4/2
Complete the Chapter Review: p218-221: terms, 1-20all, 42-44all, 47, 56-60all m.e. only, 77-80all

4/9   4.1 Population, Sample, and Data
4/11  4.2 Measures of Central Tendency
4/16  4.3 Measures of Dispersion
4/18  4.4 The Normal Distribution
4/23  4.4 The Normal Distribution cont’d
4/25  Review

1, 5, 9, 17
3&5, 15&16, 19&21
1a, 3, 7, 13
9&11, 15-19 (as possible)

Complete 4.4 set assigned above
Chapter Review: p326-328: terms, 1-3all, 5-12all.
Also complete the practice test from copies.

4/30  Chapter 4 Test
5/2   Return of Chapter 4 Test
Grade Discussion
Final Exam Information

FINAL EXAM: MA110-103 8am class: Tuesday, 5/7, 8-10am
MA110-102 11am class: Tuesday, 5/7, 10:30-12:30
Shelby Hall 2119
MA 110 Finite Mathematics Introductory Activity
Use this paper to complete each of the following. You may work alone or with a classmate.

1. Examine the pattern and fill in the blank: 1, 4, 9, 16, _____

2. Valid or Invalid? My mother likes puppies and veterinarians like puppies, so my mother is a vet.

3. What noun fits this description? Human and American and male and famous and deceased and past entertainer and from Tupelo Mississippi and called The King.

4. What noun fits this description? Artist or actor or poet or singer/songwriter.

5. Consider "If you are caught stealing, you will be arrested." What can you conclude if you are not caught stealing?

6. The “x” represents Ed’s residence. Describe Ed’s residence in relation to the city, county, state, etc.

7. If you have 3 shirts and 2 pairs of shorts, how many different outfits are possible?

8. How many students took a test if 2 made an A, 12 made a B, 12 made a C, 5 made a D, and 1 failed?

9. Match the term with the informal definition:
   mean middle value found by putting data in numerical order
   median average found using operations of addition and division
   mode the most frequent number in a set of data

10. \( \sum [(x - \bar{x})^2] = 1000 \) and \( n = 6 \)
    Find \( s = \sqrt{\frac{\sum(x - \bar{x})^2}{n-1}} \)

11. Convert \( \frac{3}{20} \) to a decimal number and a percent:
Ch 1: Logic
1.1 Deductive vs. Inductive Reasoning Notesheets

Fill in each blank with what is most likely to be the next letter:

1. abba  barb  circle  doodle  every
   a     b    c    d   ___

2. R, W, ___

3. T, F, S, E, ___, ___

We have applied __________________________________ to solve each problem.

Conclusions in inductive reasoning are ____________________________________________.

Explain why problem solving for the following items involves inductive reasoning:

Fill in the blank:  1, 4, 9, 16, __25__

My mom is a puppy lover. My mom is a woman. Therefore, all women are puppy lovers.
Note the structure of the following argument:

Syllogism:

All women are puppy lovers.
My mom is a woman.
Therefore, my mom is a puppy lover

We have applied

For any given set of premises, if the conclusion of an argument is guaranteed (inescapable in all instances), the argument is valid.

But, if the conclusion is not guaranteed (there is at least one instance in which it does not follow), the argument is invalid.

The above argument, presented in a syllogism and Venn diagram, is because

Venn Diagrams are helpful in analyzing the validity of arguments.

Basic Venn Diagrams:

- All A are B (If A, then B)
- Some A are B (At least one A is B)
- No A are B
Examine each syllogism and find the validity of the deductive argument by using a Venn diagram:

1. All wrestlers are actors
   Ralph Nader is not an actor
   Therefore, Ralph Nader is not a wrestler

2. All wrestlers are actors
   Ralph Nader is not a wrestler
   Therefore, Ralph Nader is an actor

3. Some professors wear glasses
   Einstein wears glasses
   Therefore, Einstein is a professor

4. Real men don’t eat quiche
   Oscar eats quiche
   Therefore, Oscar isn’t a real man
5. All squares are rectangles
Some quadrilaterals are rectangles
Therefore, some quadrilaterals are squares

6. No dogs are cats
All cats are house pets
Therefore, some dogs are house pets

Remember: Finding that an argument is valid does not mean that the conclusion is true.
Finding that an argument is invalid does not mean that the conclusion is false.
1.2 Symbolic Logic Notesheets

**I. Statement** — a sentence that is either true or false.  
\[ p: \text{I paint} \quad q: \text{I quilt} \quad r: \text{I read} \]

**II. Compound Statement** — a statement that contains one or more simpler statements. A compound statement can be formed by inserting the word *not* into a simpler statement or by joining two or more statements with connective words such as *and*, *or*, *if... then*.

<table>
<thead>
<tr>
<th>Examples of Compound Statements</th>
<th>Connective Word(s)</th>
<th>Symbol</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>I paint and I quilt</td>
<td>I paint, quilt, and read</td>
<td>^</td>
<td>Conjunction</td>
</tr>
<tr>
<td>I will either read or paint</td>
<td>It's not the case that I paint or quit</td>
<td>∨</td>
<td>Disjunction</td>
</tr>
<tr>
<td>If I read, then I paint</td>
<td>I paint if I read</td>
<td></td>
<td>Conditional</td>
</tr>
</tbody>
</table>

---

\[ p: \quad q: \quad r: \]

*Re-write each compound statement and symbolize:*

All women like to shop and read

No women like to read
<table>
<thead>
<tr>
<th>Term</th>
<th>Symbol</th>
<th>Word</th>
<th>Statement</th>
<th>Choose the Negation of the Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Negation</td>
<td>not</td>
<td>The senator is a Democrat</td>
<td>The Democrat is not a senator</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The senator is not a Democrat</td>
<td></td>
</tr>
<tr>
<td>All senators are Democrats</td>
<td>S</td>
<td>Some senator is not a Democrat</td>
<td>All senators are not Democrats</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>All senators are not Democrats</td>
<td></td>
</tr>
<tr>
<td>Some senators are Democrats</td>
<td>D</td>
<td>Some Democrats are not senators</td>
<td>Some senators are not Democrats</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Some senators are not Democrats</td>
<td></td>
</tr>
<tr>
<td>No senator is a Democrat</td>
<td>D</td>
<td>Some senator is a Democrat</td>
<td>Some senator is a Democrat</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Some senator is a Democrat</td>
<td></td>
</tr>
</tbody>
</table>

**The Negation (see page 22):**

```
All p are q <-> No p are q
Some p are q <-> Some p are not q
```
1.2 Symbolic Logic

THE Negation (see p 22):

<table>
<thead>
<tr>
<th>Original Statement</th>
<th>The Negation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A rock is a solid</td>
<td>A rock is not a solid</td>
</tr>
</tbody>
</table>

All the scores are passing grades

None of the scores are passing grades

No guys I date are winners

All guys I date are winners

Some people are not nice

Some people are nice

All people are nice
1.2 Symbolic Logic

Complete each of the following:

1. Use a sentence to express $(p \lor q) \rightarrow \sim r$ in words, given

   - $p$: I am innocent
   - $q$: I have an alibi
   - $r$: I go to jail

2. Translate into symbolic form using the assigned letter per statement:

   If you commit a crime and are tried and found not innocent, then you will pay a fine or go to jail.

   - $p$: You commit a crime
   - $q$: You are tried
   - $r$: You are found innocent
   - $s$: You pay a fine
   - $t$: You go to jail

3. Translate into symbolism (using letter assignments from #2 above):

   All those found innocent will not go to jail or pay a fine
1.3 Truth Tables

A truth table is a listing of all possible combinations of the individual statements as true or false, along with the resulting truth value (T or F) of the compound statement.

1. A **conjunction** is true only when both components are true.  

![Basic Conjunction Truth Table]

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p \land q</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>F</td>
</tr>
</tbody>
</table>

\[ \text{R}_1: \quad \text{The original conjunction is true only when} \]
\[ \text{I have pennies is true, I have quarters is true} \]

2. I have pennies but I do not have quarters

![2 Table]

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

\[ \text{R}_2: \quad \text{The original conjunction is true only when} \]
\[ \text{I have pennies is true, I have quarters is false} \]

3. I do not have pennies yet I do have quarters

![3 Table]

None of the above conjunctions are equivalent; they do not have identical truth values in corresponding entries.
II. A disjunction is true only when at least one component is true.

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

Basic Disjunction Truth Table

1. You owe taxes or you get a refund

\[
\begin{array}{c|c|c}
 p & q & p \lor q \\
\hline
 T & T & T \\
 T & F & T \\
 F & T & T \\
 F & F & F \\
\end{array}
\]

\( \text{R}_4: \) The original disjunction is only false when
You owe taxes is false, You get a refund is false

2. \( \neg q \lor p \)

\[
\begin{array}{c|c|c}
 p & q & \neg q \lor p \\
\hline
 T & T & T \\
 T & F & T \\
 F & T & T \\
 F & F & T \\
\end{array}
\]

3. Either an item is pink or it is not pink
p: It is pink \quad \neg p: It is not pink

\[
\begin{array}{c|c|c}
p & \neg p & p \lor (\neg p) \\
\hline
 T & F & T \\
 F & T & F \\
\end{array}
\]
III. A conditional is true unless the premise is true and the conclusion is false. Read p 35.

**Basic Conditional Truth Table**

<table>
<thead>
<tr>
<th>premise</th>
<th>conclusion</th>
<th>conditional</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>q</td>
<td>p → q</td>
</tr>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
<td>T by default</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>T by default</td>
</tr>
</tbody>
</table>

1. If you pass a class then you get course credit.

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p → q</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>T</td>
<td>F</td>
<td>F</td>
</tr>
<tr>
<td>F</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td>F</td>
<td>F</td>
<td>T</td>
</tr>
</tbody>
</table>

→ R2: The original conditional is only false when Passing class is true, Getting credit is false/does not occur

Explanation of R3: Passing class is false so someone does not pass. Getting course credit is true so someone does get credit. The original conditional “If you pass a class then you get course credit” is true by default. The original conditional does not state that the ONLY WAY to get course credit is to pass a class. There is a promise that passing will result in credit, and this is a true statement UNLESS someone passes and course credit does not result.

2. q → p

3. No prince is a queen

If you’re a ____________________________

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>q → p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Are any of the compound statements thus far equivalent?
IV. DeMorgan’s Laws

1. \[ \sim (p \lor q) \equiv \sim p \land \sim q \]

I do not have pennies OR quarters means I don’t have pennies AND I don’t have quarters.
It’s not the case that you’re a prince OR a queen means you are not a prince AND you are not a queen.
Not being in the Army OR the NAVY means you’re not in the Army AND you’re not in the NAVY.

Prove this equivalence:

<table>
<thead>
<tr>
<th>p</th>
<th>q</th>
<th>p \lor q</th>
<th>\sim (p \lor q)</th>
<th>p</th>
<th>q</th>
<th>\sim p</th>
<th>\sim q</th>
<th>\sim p \land \sim q</th>
</tr>
</thead>
<tbody>
<tr>
<td>T</td>
<td>T</td>
<td>T</td>
<td>F</td>
<td>T</td>
<td>T</td>
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2. \[ \sim (p \land q) \equiv \]

I don’t have pennies AND quarters means

Someone cannot be a prince AND a queen means

Prove this equivalence:

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V. Equivalent expressions have identical truth values for corresponding entries.

Determine whether the following statements are equivalent by use of truth tables:

“It’s not the case that all furniture is made of wood”

“It is furniture but it is not made of wood”
1.3 Supplementary key for 21-27

21) \( R_2 \): The original conditional is only false when
   - The premise "It is raining" is true
   - The cor. "The streets are wet" is false

23) \( R_4 \): The original conditional is only false when
   - "It rains" is false
   - "The water supply is rationed" is false

25) \( R_2 \): The original conditional is only false when
   - "It is a square" is true
   - "It is a rectangle" is false

27) \( R_1 \): The original conditional is only false when
   - "It is a square" is true
   - "It is a triangle" is true

\[ \text{NOTE} \quad \#23,25,27 \text{ require re-write} \]

23) \( \text{If it doesn't rain, the water supply isn't rationed} \quad \neg p \rightarrow q \)

25) \( \text{If it is a square, then it is a rectangle} \quad p \rightarrow q \)

27) \( \text{If it is a square, then it is not a triangle} \quad p \rightarrow \neg q \)
Ch 1: Logic
Parenthesis Practice

r: I run  s: I swim  t: I tumble

1. I run and swim, or I tumble.

2. I run, and I swim or tumble.

3. If I run, then I swim and tumble.

4. I swim and tumble if I run.

5. If I run, then I swim, and I tumble.

6. I swim if I run, and I tumble.

7. I tumble, and if I run, I swim

8. I do not run but I do swim.

9. It's not the case that I run and swim.

10. I do not run and swim.

11. I do not run or I do not swim.

12. I do not run or swim.

13. I do not run and I do not swim.
1. I run and swim, or I tumble. \((r \land s) \lor t\)

2. I run, and I swim or tumble. \(r \land (s \lor t)\)

3. If I run, then I swim and tumble. \(r \rightarrow (s \land t)\)

4. I swim and tumble if I run. \(r \rightarrow (s \land t)\)

5. If I run, then I swim, and I tumble. \((r \rightarrow s) \land t\)

6. I swim (if I run) and I tumble. \((r \rightarrow s) \land t\)

7. I tumble, and if I run, I swim. \(t \land (r \rightarrow s)\)

8. I do not run but I do swim. \(\neg r \land s\)

9. It's not the case that I run and swim. \(\neg (r \land s)\)

10. I do not run and swim. \(\neg (r \land s)\)

11. I do not run or I do not swim. \(\neg r \lor (\neg s)\)

12. I do not run or swim. \(\neg (r \lor s)\)

13. I do not run and I do not swim. \(\neg r \land (\neg s)\)
Chapter 1 Take-home Quiz

1. Determine the validity of each argument. 
   Venn all possible cases, state “valid” or “invalid” and explain the determination of “valid” or “invalid”.

   a) All monkeys are animals
      Bands are not animals
      Therefore, no bands are monkeys

   b) Some actors are famous
      Nicholas Cage is an actor
      Therefore, Nicholas Cage is famous

2. Check each item which requires deductive reasoning to conclude or solve the problem:

   _____ Fill in the blank with what is most likely to be the next letter: J, F, M, A, M, J, J, A
   _____ Each word is assigned the first letter in its spelling. Fill the blank with the letter for August:
      Jan Feb March April May June July August
      J F M A M J J _____

   _____ All actors are famous
      Nicholas Cage is an actor
      Therefore, Nicholas Cage is famous

   _____ Nicholas Cage is famous
      St. Nicholas is famous
      Therefore, all Nicholas’s are famous

   _____ A Honda Civic is reliable, a Honda Accord is reliable, and a Honda Odyssey is reliable, 
      so a Honda Fit is reliable as well.

   _____ No foreign made cars are unreliable and a Honda is foreign made so a Honda is reliable.

   Explain why each checked item requires deductive reasoning:
3. Circle the symbolism that could represent each compound statement:

a. All dogs are not cats
   \[ p \rightarrow \sim q \quad \sim p \]

b. The food is not delicious or nutritious
   \[ \sim p \lor \sim q \quad \sim (p \lor q) \]

c. It’s not the case that the food is delicious or nutritious
   \[ \sim p \lor \sim q \quad \sim (p \lor q) \]

d. I surf the net and purchase items and do not pay sales tax
   \[ p \land q \land \sim r \quad p \land q \land r \]

e. If the product has a defect then you get a refund or a credit
   \[ p \rightarrow q \lor r \quad p \rightarrow (q \lor r) \]

f. You get a credit or a refund if the product is defective
   \[ p \rightarrow q \lor r \quad p \rightarrow (q \lor r) \quad q \lor r \rightarrow p \]

g. It is snowing and classes are canceled
   \[ p \lor q \quad p \land q \]

4. Circle the sentence that is considered THE negation of “No dogs can bark”:

   Some dogs can bark

   Some dogs can’t bark

   A barking dog is bothersome

   All dogs can bark

5. Re-write each sentence as a traditional “If...then” statement:

No dogs can bark

All dogs can bark

Match each basic compound statement to the proper truth table:

\[ 6. p \land q \quad 7. p \lor q \quad 8. p \rightarrow q \]

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23
Term ominions: biconditional, contra-positive, converse, hypothesis, implication, universal, necessary, sufficient

1) Each letter is the consonant following the first vowel.
2) Valid. Since Rocky is a truck driver and all truck drivers are union members, Rocky is inescapably a union member.
3) Invalid. Casey Jones is an engineer, yet he is not necessarily a mechanic. He may or may not be a mechanic.
4) Invalid. A gun is not an animal, so it may or may not be dangerous. It is possibly dangerous.
5) Valid: a & d = b & c (see p. 22)

14) a \ p \land \ q \quad b \ nq \rightarrow (\neg p) \quad c \ p \land (\neg q) \quad d \ n(\neg p \lor \neg q)

16a) p \rightarrow \neg q means "If it is expensive, then it is not desirable."

16b) \neg (p \lor q) means "It is not expensive or desirable" or "It is not the case that it is either expensive or desirable."

\[ \begin{array}{c|c|c|c} p & q & \neg q & p \lor (\neg q) \\ \hline T & T & F & T \\ T & F & T & T \\ F & T & F & F \\ F & F & T & T \end{array} \]

\[ \begin{array}{c|c|c|c|c} p & q & \neg p & \neg p \rightarrow q \\ \hline T & T & F & F \\ T & F & F & T \\ F & T & T & T \\ F & F & T & F \end{array} \] by default
20. The car is unreliable or expensive.

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If the car is reliable, it is expensive

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28. She's a Democrat or she didn't vote.

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One isn't a Democrat & she didn't vote

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39a. p > q means "If you're an acid jogger, then you're healthy."
39b. q > p means "If you're healthy, then you're an acid jogger."
39c. ~p > ~q means "If you aren't an acid jogger, then you're not healthy."
39d. ~q > ~p means "If you're not healthy, then you're not an acid jogger.

Extra Practice 8 Make truth tables for 39a-d and note:
a ≠ b, c ≡ d, a ≡ d, b ≡ c

40a. The economy improves if unemployment goes down.
40b. If unemployment goes down, then the economy improves.

46a. All gemstones are valuable (rewrite)
46b. If it is a gemstone, then it is valuable.