**CSC175 Assignment 3 Summer 2019 Name \_\_\_\_\_\_\_\_Donald Tvedt\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   
Directions:** Download this file and save as lastnameAssignment3SP19. Type all solutions on this document. Use equation editor when necessary. Upload Word document to Blackboard by **Monday at 11:59 PM.**  
Points in [brackets]. Total: 60 points Show work and explain concepts thoroughly!  
  
[4] points for a professional looking document (organization, neatness, equation editor, etc.)  
  
1) [6] Given the following propositions, write out the English sentences for the given the symbolic forms.   
 = “5+3=14” = “5 is an odd integer” = “25 is a perfect square”

a) = **Five plus three equals fourteen or five is an odd integer**  
b) = **If five is not an odd integer then five plus three equals fourteen**  
c) = **Twenty-five is not a perfect square if and only if five plus three equals fourteen and five is an odd integer**

2) [4] For parts a), b), and c) in number 1 above, determine if the sentences above are true or false. For full credit, explain why.

a) = **True this is a or so only one of the propositions needs to be true, 5 is an odd integer = true**  
b) = **True the hypothesis is false in the conditional then the statement is true by default**  
c) = **True when both the hypothesis is false and the conditional is false then the statement is true**

3) [5] Create the truth tables for and . Are they equivalent? If so, what law was used? If not, why not (was a law used incorrectly)?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| T | T | F | T | F | F | T |
| T | F | F | T | F | F | T |
| F | T | T | T | T | T | T |
| F | F | T | F | F | F | F |

**These are not equivalent, the Absorption law was used incorrectly.**

4) [5] Create the truth tables for and . Are they equivalent? If so, what law was used? If not, why not (was a law used incorrectly)?

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |
| T | T | F | F | T | F | F |
| T | F | F | T | T | F | F |
| F | T | T | F | F | T | T |
| F | F | T | T | T | F | F |

**These are equivalent. DeMorgan’s Law**

5) [7] Create the truth table for the compound proposition. Based on the results of the truth table, what is the truth of the simple propositions that would cause the compound proposition to be false?

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| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |
| T | T | T | F | F | F | T | T |
| T | T | F | F | T | F | T | T |
| T | F | T | T | F | T | F | F |
| T | F | F | T | T | T | T | T |
| F | T | T | F | F | F | T | T |
| F | T | F | F | T | F | T | T |
| F | F | T | T | F | F | F | T |
| F | F | F | T | T | F | T | T |

**The only time that the compound proposition is false is when the Hypothesis is True and the conditional is false.**

6) [7] Write the negation of each compound proposition as an English sentence.

a) The Twins do not play baseball and the Yankees play soccer.

**The Twins play baseball and the Yankees do not play soccer.**  
b) If the Lakers play basketball, then the Celtics do not play hockey.

**If the Lakers do not play basketball, then the Celtic do play hockey.**  
c) If the Louisville Cardinals play basketball, then the Minnesota Gophers play football and do not play baseball.

**If the Louisville Cardinals do not play basketball, then the Minnesota Gopher play baseball and play football.**

7) [6] Consider the two compound propositions: If Sarah is a math professor, then Dave is not an English professor. If Dave is not an English professor, then Jim doesn’t like to read.

a) Using the chain rule (syllogism), what sentence is equivalent ?

**If Sarah is a math professor, then Jim doesn’t like to read.**

b) If is false, what can we say about Dave and Jim? Explain your reasoning.

**Using the truth table for conditionals if the hypothesis is true the only time the answer is false is when the conditional is false. Therefore we can conclude that Dave is not an English professor and Jim likes to read.**

c) Assume is true. Logically, does Sarah need to be a math professor? Explain your reasoning.

**Using the truth table for conditionals we can conclude that Sarah does not have to be a math professor in order for to be true. If the Hypothesis is false we can say the statement is true by default.**

8) [7] Name the law (or laws if two are used) from pages 58-59 that is used in each equivalence. (DO NOT CREATE A TRUTH TABLE.)

a) = **Distributive Law**  
 b) = **Contrapositive Law**  
 c) = **Commutative Law**  
 d) = **Biconditional Equivalence**  
 e) = **Involution Law**  
 f) = **Conjunctive Simplification**

9) [9] Follow the directions below. (**One bonus point if you are creative enough to make laugh or smile.)**

a) Create your own simple propositions in English for . There should not be the word “not” in any of the three simple propositions.

Alex loves playing the guitar Aleah likes playing the violin Donald likes playing the trumpet

b) Write the compound English sentence: .

**If Alex loves playing the guitar then Aleah does not like playing the violin or Donald likes playing the trumpet**

c) Write the negation of the English sentence in part b (as an English sentence).

**If Alex loves playing the guitar then Aleah does not like playing the violin and Donald does not like playing the trumpet**

d) For parts b),and c) above, determine if the sentences are true or false. For full credit, explain why.

**Part B. Is true = the hypothesis is true Alex loves playing the guitar and the conditional because of the OR makes that true also because Donald likes playing the trumpet.**

**Part C. Is false = the hypothesis is true Alex love paying the guitar but the conditional is false making the proposition false.**