Assignment 1, Part 2: The Logic of Conditional Statements

Start Assignment

Due Tuesday by 11:59pm **Points** 100 **Submitting** a text entry box or a file upload
File Types pdf **Available** until Jan 18 at 11:59pm

Purpose

The purpose of this assignment is to study a part of propositional calculus by simplifying and evaluating conditional statements, and their negations, inverses, converses, and contrapositives using truth tables and the properties of logic (**CLO 1 (https://canvas.oregonstate.edu/courses/1946372/pages/start-here-overview)** , **MLO 2 - MLO 3 (https://canvas.oregonstate.edu/courses/1946372/pages/week-1-overview)**).

Instructions

This assignment is due by Tuesday (Week 2) at Midnight. A late assignment must be submitted no more than 48 hours after the original deadline (with a 15% penalty every 24 hours).

Write complete answers to each of the following questions. All are from the ends of the indicated sections in our text; for these, you **MUST** provide complete answers in accordance with the directions given (in the rubric). Show your work, when appropriate, for possible partial credit. This is not a group project; do your own work. You must follow the header format as below -

First name Last name

CS-225: Discrete Structures in CS

Homework 1, Part 2

Exercise Set #: Problem # (.....)

Lastly, you do not have to rewrite the questions.

Homework Problems

Exercise Set 2.2 of the Required Textbook- Problem #20(c, e, g), #31, #39, #45, #46(c, d, e, f), #50 (Reducing the statement is not the point of the exercise. The instructions ask you to use specific logical equivalences to rewrite the statement in an effort to show how the same statement

can be written in different ways. So, for part ii) of the question, you are supposed to use the logical equivalences for disjunction (∨) only (however, you can use the double negative law here, which is not necessary, of course).

Problems on Canvas:

#1 Verify the logical equivalence with laws: $[(p \to q) \wedge (q \to r)] \to (p \to r) \equiv t$ (hint: start with the implication law that $p \to q \equiv \sim p \vee q$)

#2 (a) Use the logical equivalences $p \to q \equiv \sim p \vee q$ and $p \leftrightarrow q \equiv (\sim p \vee q) \wedge (\sim q \vee p)$ to rewrite the statement form without using the symbol → or ↔, and
(b) Use the logical equivalence p ∨ q ≡∼(∼p ∧ ∼q) to rewrite the statement form using only conjunction (∧) and negation (∼).

$[(p \vee q) \wedge (p \to r) \wedge (q \to r)] \to r$

Submission Details

Assignments should be submitted to Canvas in .pdf format. You are allowed to submit scanned handwritten answers saved in .pdf format as well.

Academic Integrity Reminder

Note: completion of this assignment using work from external sources (e.g. other students or websites) is likely to cause unintended academic misconduct violations. Examples of these may include **plagiarism (https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu)** and/or **cheating (https://canvas.oregonstate.edu/courses/1946372/pages/academic-integrity-at-osu)**.

We recognize that, in the process of completing your work, you may wish to consult various sources. Please refer to the resources in the **Academic Integrity Module (https://canvas.oregonstate.edu/courses/1946372/modules/3118541)**, or contact your instructor if you are not sure if your work is compliant with the **Code of Student Conduct (https://studentlife.oregonstate.edu/pre-student-conduct-community-standards)**.

Grading Criteria

Below is the rubric that would be used to grade this assignment. This assignment will be graded within **5** days of its *due date.*

HW1, Part2

Criteria	Ratings		Pts
HW1, part 2 - Set 2.2 - Q#20 (c, e, g) Negating the conditional statements. Showing your work is not necessary. 2.5 pts will be deducted for each incorrect answer.	**10 to >7.5 pts** **Full Marks** The negations of the conditional statements are correct.	**7.5 to >0 pts** **Partial Credit** The negations of the conditional statements are incorrect.	10 pts
HW1, part 2 - Set 2.2 - Q#31 Using the truth table method, determining whether the converted statement form is a tautology or not. **You must provide a conclusion (the converted statement form is either a tautology or not). 3 - 7 pts will be deducted for the incorrect/incomplete answer.	**10 to >7.0 pts** **Full Marks** The truth table is complete and correct.	**7 to >0 pts** **Partial Credit** The answer is incomplete or incorrect.	10 pts
HW1, part 2 - Set 2.2 - Q#39, Q#45 Rewriting the statements in if-then forms. 2.5 pts will be deducted if the answer is incorrect.	**10 to >7.0 pts** **Full Marks** The answers are rewritten correctly.	**7 to >0 pts** **Partial Credit** The answers are rewritten incorrectly.	10 pts
HW1, part 2 - Set 2.2 - Q#46(c, d, e, f) Determining which of the provided sentences are true and which are not necessarily true. You MUST justify why a sentence is "true" or "not necessarily true". 3 pts will be deducted for each incorrect answer. 2 points will be deducted for each missing justification.	**20 to >17.0 pts** **Full Marks** The answer is correct.	**17 to >0 pts** **Partial Credit** The answer is not written correctly.	20 pts
HW1, part 2 - Set 2.2 - Q#50 Part A requires rewriting the statement without the symbols → or ↔. No further simplification is	**20 to >10.0 pts** **Full Marks** The answer is	**10 to >0 pts** **Partial Credit** The answer is not	20 pts

Criteria	Ratings		Pts
required. Part B requires rewriting the statement using only conjunction (∧) and negation (~). No further simplification is required. However, besides the given laws, you only can use De Morgan's and double negative laws. 10 -15 pts will be deducted for each incorrect/ incomplete answer. 10 points will be deducted if you use any other laws than the ones that are allowed here.	rewritten correctly.	rewritten correctly.	
HW1, part 2 - Canvas Problem #1 Showing a logical equivalence using Theorem 2.1.1 and logical equivalence of conditional. You must mention the law that you have used in each step. 1.5 pts will be deducted for each incorrect or incomplete step.	**10 to >8.5 pts** **Full Marks** The answer is rewritten correctly.	**8.5 to >0 pts** **Partial Credit** The answer is not rewritten correctly.	10 pts
HW1, part 2 - Canvas Problem #2 Part A requires rewriting the statement without the symbols → or ↔. No further simplification is required. Part B requires rewriting the statement using only conjunction (∧) and negation (~). No further simplification is required. However, besides the given laws, you only can use De Morgan's and double negative laws. 10 -15 pts will be deducted for each incorrect/ incomplete answer. 10 points will be deducted if you use any other laws than the ones that are allowed here.	**20 to >10.0 pts** **Full Marks** The answer is rewritten correctly.	**10 to >0 pts** **Partial Credit** The answer is not rewritten correctly.	20 pts
General Deductions Late Penalty - 15% deduction for each day late up to two days.	**0 pts** **Deductiton Rules** The submission is – - Late by 1 – 24 hours (-15 points) - Late by 25 – 48 hours (-30 points) - Late by >48 hours (-100 points)	**0 pts** **Full Marks**	0 pts

Criteria	Ratings	Pts
	Total Points: 100	