Assignment 2, Part 1: The Logic of Quantified 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 25 at 11:59pm

Purpose

The purpose of this assignment is to study predicate logic by translating English sentences and symbols for universally and existentially quantified statements, writing the negation of a quantified statement involving either one of the two quantifiers, writing the contrapositive, converse, and inverse of universal conditional statements and rewriting statements as universal conditional statements without using the words necessary, sufficient or only if. (**CLO 5 (https://canvas.oregonstate.edu/courses/1946372/pages/start-here-overview)** , **MLOs 1-4 (https://canvas.oregonstate.edu/courses/1946372/pages/week-2-overview)**).

Instructions

This assignment is due by Tuesday (Week 3) at Midnight. A late assignment must be submitted no more than 48 hours after the original deadline (with 15% penalty for every 24 hours).

I highly recommend that you try out similar examples and problems, for which the solutions are already provided at the back of the required textbook.

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 2, Part 1

Exercise Set #: Problem # (.....), Problem on Canvas

Lastly, you do not have to rewrite the questions.

Homework Problems

Exercise Set 3.1 of the required textbook: Question #29 (b, c), #30(a, c)

Exercise Set 3.2 of the required textbook: Question #8, #14, #31, #44, #48, #49 (hint: please interpret the phrase "For all x, r(x) not a sufficient condition for s(x)" to mean: ~ (For all x, if r(x) then s(x)). I meant that the statement "r(x) is not a sufficient condition for s(x)" means that you take the regular "r(x) is a sufficient condition for s(x)" and negate it. Similarly, "r(x) is not a necessary condition for s(x)" means that you take the regular "r(x) is a necessary condition for s(x)" and negate it.)

and

Problem on Canvas:

Let A(x), C(x), F(x), H(x), and L(x) be the predicates

A(x): x is a good athlete
C(x): x is confident
F(x): x is focused
H(x): x is healthy
L(x): x is a leader

Express each of the following English sentences in terms of A(x), C(x), F(x), H(x), and L(x) quantifiers, and logical connectives. Assume the domain (D) is the set of all people. Please see the example problems provided here: **HW2-Part1-Translating English Sentences to Quantified Logic Statements.pdf (https://canvas.oregonstate.edu/courses/1946372/files/102823103?wrap=1)** for the correct answer formats.

(You may need to use these symbols: ≥ ≤ ≠ ¬ ∧ ∨ ⊕ ≡ → ↔ ∃ ∀)

a) All confident leaders are not good athletes. [Please consider that predicates combine conjunctively. So, 'x is a confident leader' means that x is confident and x is a leader.]

b) A person is a good athlete only if it is the case that both the person is focused and the person is healthy.

c) Being a leader is not a necessary condition for being a good athlete.

d) Some confident people are neither healthy nor are they focused.

e) A person is not a good athlete unless he/she is confident.

Note: We often represent universal quantified statements without actually explicitly using the quantifiers "for all" or "any" or "every" etc.

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.*

HW-2, Part 1

Criteria	Ratings		Pts
Set 3.1 - Q# 29(b, c), Q# 30 (a, c) Indicating which of the statements are true and which are false and justifying your answer. 2.5-4 points will be deducted for each incomplete/incorrect answer.	**20 to >17.5 pts** **Full Marks** All the answers are correct.	**17.5 to >0 pts** **Partial Marks** One or more answers are incorrect/incomplete.	20 pts
Set 3.2 - Q# 8, Q# 14 Write a negation (formal or informal) for each of the statements. 2.5-4 points will be deducted for each incomplete/incorrect answer.	**10 to >7.5 pts** **Full Marks** All the answers are correct.	**7.5 to >0 pts** **Partial Marks** One or more answers are incorrect/incomplete.	10 pts
Set 3.2 - Q# 31 Writing the contrapositive, converse, and inverse of the universal conditional statement and indicating which of the four statements are true and which are false. Finally, giving counterexamples for the ones that are false. 2.5-4 points will be deducted for each incomplete/incorrect answer.	**10 to >8.0 pts** **Full Marks** All the answers are correct.	**8 to >0 pts** **Partial Marks** One or more of the answers are incorrect/ incomplete.	10 pts
Set 3.2 - Q#44, #48, Q#49 Rewrite the statements without using the words necessary/sufficient/only if. 2.5-4 points will be deducted for each incomplete/incorrect answer.	**30 to >7.5 pts** **Full Marks** All the answers are correct.	**7.5 to >0 pts** **Partial Marks** One or both of the answers are incorrect.	30 pts
Problem on Canvas Rewriting the statements formally using quantifiers, variables, and predicates. 2.5-4 points will be deducted for each incomplete/incorrect answer.	**30 to >27.5 pts** **Full Marks** All the answers are correct.	**27.5 to >0 pts** **Partial Marks** One or more answers are incorrect.	30 pts
General Deductions Late Penalty - 15% deduction for each day late up to two days.	**0 pts** **Deduction 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