Assignment 3, Part 2: Indirect Proof Methods

Start Assignment

Due Tuesday by 11:59pm **Points** 100 **Submitting** a text entry box or a file upload
File Types pdf **Available** until Feb 1 at 11:59pm

Purpose

The purpose of this assignment is to practice the two most familiar forms of indirect proof - which are proof by contraposition and proof by contradiction. Understanding these two methods is important because there are times when writing direct proof to a theorem is difficult and inconvenient.(**CLO 3 (https://canvas.oregonstate.edu/courses/1946372/pages/start-here-overview)** , **MLO 3-4 (https://canvas.oregonstate.edu/courses/1946372/pages/week-4-overview)**).

Instructions

This assignment is due by Tuesday (Week 4) at Midnight. Late assignments must be submitted no more than 48 hours after the original deadline (with a 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 below). Some examples of the complete answers are provided here:**HW3_Examples.pdf (https://canvas.oregonstate.edu/courses/1946372/files/102823572/download?wrap=1)** . **You must show your work here**. You can use the proof templates provided here: **Proof by Contraposition Template.docx (https://canvas.oregonstate.edu/courses/1946372/files/102823806?wrap=1)** and **Proof by Contradiction Template.docx (https://canvas.oregonstate.edu/courses/1946372/files/102823404?wrap=1)** .

. 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 3, Part 2

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

Lastly, you do not have to rewrite the questions.

Homework Problems

Instruction: Use the method of proof by contraposition or/and by contradiction **only** if proving the problem statements given below -

Exercise Set 4.7 of the required textbook: #18, #27, #28

Exercise Set 4.8 of the required textbook: #18.a, #18.b

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.*

HW3, Part2

Criteria	Ratings		Pts
Set 4.7: Question #18 Use the contradiction method to construct a proof. Write down the initial supposition, goal, deductions, and conclusion properly. Don't forget to mention any definitions or properties that you have used to construct the proof.	**20 to >18.0 pts** **Full Marks** The answer is complete and correct. The negation, supposition, and goal are worth 10 points, the deductions are worth 8 points, and the conclusion is worth 2 points).	**18 to >0 pts** **No Marks** (a) the negation is incorrect (-5pts) , (b) The phrase "by definition" is missing (-2.5 pts), the definition is incomplete/ incorrect(-2.5 pts), the sentence "denominator is not zero" missing (-2.5pts), the phrase "by zero product property" is missing (-2.5pts), assumption/ goal is missing/incorrect (-2.5pts for each), algebraic mistakes/incorrect deduction (-5pts), the conclusion is missing(-2 pts).	20 pts
Set 4.7: Question #27 Use either the contraposition or contradiction method to construct a proof. Write down the initial supposition, goal, deductions, and conclusion properly. Don't forget to mention any definitions or properties that you have used to construct the proof.	**20 to >18.0 pts** **Full Marks** The proof is complete and correct. (The supposition and goal are worth 8 points, the deductions are worth 10 points, and the conclusion is worth 2 points).	**18 to >0 pts** **No Marks** The phrase "by definition" missing/ the definition is incomplete/ the justification "integers are closed under addition/ subtraction/multiplication operation" is missing (-3 pts), the assumption is missing/incorrect (-4pts), the goal is missing/incorrect (-4pts), the deduction step is incorrect(-5pts), the conclusion is missing(-2 pts).	20 pts
Set 4.7: Question #28 Use either the contraposition or contradiction method to construct a proof. Write down the initial supposition, goal, deductions, and conclusion properly. Don't forget to mention any definitions or properties that you have used to construct the proof.	**20 to >18.0 pts** **Full Marks** The proof is complete and correct. (The supposition and goal are worth 8 points, the deductions are worth 10 points, and the conclusion is worth 2 points).	**18 to >0 pts** **No Marks** The phrase "by definition" missing/ the definition is incomplete/ the justification "integers are closed under addition/ subtraction/multiplication operation" is missing (-3 pts), the assumption is missing/incorrect (-4pts), the goal is missing/incorrect (-4pts), the deduction step is incorrect(-5pts), the conclusion is missing(-2 pts).	20 pts
Set 4.8: Question #18(a) Use either the contraposition or contradiction method to construct a proof. Write down the initial supposition, goal, deductions, and conclusion properly. Don't forget to mention any definitions or properties that you have used to construct the proof.	**20 to >18.0 pts** **Full Marks** The proof is complete and correct. The supposition and goal are worth 8 points, the deductions are worth 10 points, and the conclusion is worth 2 points).	**18 to >0 pts** **No Marks** The phrase "by definition" missing/ the definition is incomplete/ the justification "integers are closed under addition/ subtraction/multiplication operation" is missing (-3 pts), the assumption is missing/incorrect (-4pts), the goal is missing/incorrect (-4pts), the deduction step is incorrect(-5pts), the conclusion is missing(-2 pts).	20 pts

Criteria	Ratings		Pts
Set 4.8: Question #18(b) Use either the contraposition or contradiction method to construct a proof. Write down the initial supposition, goal, deductions, and conclusion properly. Don't forget to mention any definitions or properties that you have used to construct the proof.	**20 to >18.0 pts** **Full Marks** The proof is complete and correct. The supposition and goal are worth 8 points, the deductions are worth 10 points, and the conclusion is worth 2 points).	**18 to >0 pts** **No Marks** The phrase "by definition" missing/ the definition is incomplete/ a justification is missing (-2 pts), the assumption is missing/incorrect (-4pts), the goal is missing/incorrect (-4pts), the deduction step is incorrect(-5pts), the conclusion is missing(-2 pts).	20 pts
Late Submission Deduction 10% deduction for each late day up to 2 days.	**0 pts** **Deduction Rules** The submission is – - Late by 10 minutes – 24 hours (-15 points) - Late by >24 hours – 48 hours (-30 points) - Late by >48 hours (-100 points)	**0 pts** **No Deduction**	0 pts
			Total Points: 100