ICS 6B F23 Take Home Exam Redo 1

Due: October 12th, 2023 at 11:59PM

Name: _____

UCI NetID : | | | | | | | | |

(**alpha-numeric; NOT your student ID**)

- **Read** the instructions of each question carefully.
- **Please write your answers on the answer sheet instead and only submit the answer sheet.** We changed the format to save paper and give more space for work. Place your answers in the boxed regions. Writing outside of the boxes will not be considered as part of your answers.
- **Show all of your work. For problems without work to show then you should provide a brief 1 to 2 sentence description of what you did. Redo Specific: You must explain your mistake on your original exam in the RED box, or else your redo will not be graded.**
- An answer where thought process is unclear will be given a grade of Not Yet
- Your submission should follow the template exactly. Any insertion, removal, or reordering of pages from the original template may result in readers not grading certain problems. In such an event you will receive "Not Yet" and no feedback on the problems in question.
- This exam will cover the Outcomes from the L Learning Objective
- Please keep in mind of the academic honesty guidelines. This take-home exam is to be **completed individually, with no outside help**. You may use any resources from our class (ZyBooks and resources from Canvas), but you may not use any other online resources.
- You may choose to print the exam or use a digital editor for completing the exam. It is required that you use this PDF to complete your work. If you have no access to a printer or digital tools to fulfill the exam, feel free to reach out to the staffs regarding your concern.
- If you have any questions, please post a private Ed or attend available Office Hours. Note that we are not allowed to provide specific help to answering the exam questions.

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Problem 1.1 (L1)

Use the following propositions to translate the English sentences into logic.

- G: Mandy has gotten a job
- A: Mandy is applying to jobs
- Q: Mandy is graduating this quarter

a) Mandy is not applying to jobs despite graduating this quarter.

b) In order for Mandy to get a job, she must first apply for jobs.

c) Given that Mandy is graduating this quarter, she is applying to jobs but has not gotten one yet.

Problem 1.2 (L1)

Use the following propositions to translate the logical statements into English. Translate the expressions directly into English. Do NOT use laws of logic to simplify the expression first. Each part comes with specific requirements for how to translate the conditional operators. Failure to follow these requirements will result in a Not Yet.

- H: Mandy is hungry
- S: Mandy is sleepy
- O: Mandy is overworked
- L: Lawson is bugging Mandy with useless stuff

a) $(S \wedge O) \leftrightarrow (L \rightarrow H)$ (do not use "if" or "only if", for conditional (not biconditional) use "when".)

b) $(O \rightarrow H) \vee (O \rightarrow S)$ (using "necessary" for one conditional and "requires" for the other.)

c) $(S \wedge H) \rightarrow (O \vee L)$ (using "only while" for conditional)

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Problem 2 (L.2)

Prove using the laws of logic (show all steps) that the following two propositions are equivalent:

- $((I \to J) \vee K) \wedge ((\neg K \to J) \vee (J \to K))$
- $(\neg K \to J) \vee \neg I$

Problem 3 (L.3)

a) Complete the truth table below for the following expression:

- $(p \to q) \vee (\neg p \to q)$
- $(p \vee q) \to (\neg p \to \neg q)$

b) The above expressions are not equivalent. Give the row number that proves that these expressions are not equivalent. If there are more than one correct answer then only gave a single answer.

Problem 4.1 (L.4)

Show whether $\neg M \vee (\neg Q \wedge D) \vee (\neg D \wedge Q) \vee ((\neg M \vee \neg D) \to (M \wedge D))$ is a tautology or not. Prove your answer within the box below.

Problem 4.2 (L.4)

For the following pairs of expressions, state whether or not the expressions are equivalent. Prove your answer within the boxes provided.

a) $A \wedge (B \vee C)$, $\quad A \wedge ((A \wedge B) \vee (A \wedge C)) \wedge ((C \wedge B) \vee C)$

b) $A \vee ((\neg A \vee B) \wedge (\neg A \vee \neg B))$, $\quad ((X \vee Y) \wedge (X \vee \neg Y)) \vee (X \wedge Y) \vee \neg(((\neg X \vee \neg Y) \to X) \wedge Y)$