***KWANTLEN* POLYTECHNIC UNIVERSITY**

INFO 1214 – Spring 2024

ASSIGNMENT 2

Textbook: Epp, S., **Discrete Mathematics with Applications**, 4th Edition

From sections 2.2 and 2.3

OBJECTIVES

Upon successful completion of this assignment, the student will be able to:

- Demonstrate an understanding of logical form, logical equivalence, and conditional statements
- Understand the validity of arguments and determine if an argument form is valid or invalid

ASSIGNMENT

Answer the following questions, using the course notes, books and/or reliable sources from the Web. Do not merely copy solutions you may find; all answers should be in your own wording. After each answer, **include a reference to your source** for the answer **if and only if** you used a source other than the textbook to help you solve the problem. Please double-check your answers before submitting them.

Note that copying and pasting an answer from a reference or handing in the same answer as another student is considered plagiarism and/or cheating and will result in a zero for the entire assignment. Answers must be your own work and in your own words!

NOTE: Late submissions are not accepted for this assignment – this allows me to post the answer key to Assignment #2 in time for Quiz #1

1. **Construct a truth table for the following (4 pts), remembering to observe the order of operations discussed in class (Lesson #3, Slides 22-24):**

   a. $\sim a \wedge b \rightarrow c$

   b. $(a \rightarrow \sim b) \rightarrow (b \rightarrow c)$

2. **Write negations for each of the following statements (3 pts) (Lesson #3, slides 33-34):**

   a. If today is January, then tomorrow is not Good Friday.

   b. If ***x*** is negative or ***x*** is 0, then ***x*** is nonpositive.

   c. If ***x*** is divisible by 15, then ***x*** is divisible by 3 and ***x*** is divisible by 5.

3. **Write the following statement in its contrapositive, converse, and inverse forms (3 pts) (Lesson #3, Slides 35-40):**

   If Pram is allowed in Marc's house, then she is a cooking expert.

4. **Rewrite the statement in if-then form in two ways, one of which is the contrapositive of the other (2 pts) (Lesson #3, Slides 42-43):**

   Warren will be allowed in Tracey's house only if he is gardening expert.

5. **Construct a truth table for the following (2 pts) (Lesson #3, Slides 44-47):**

$$(a \rightarrow b) \leftrightarrow (b \rightarrow c)$$

6. **Rewrite the following statements in "if-then" form (2 pts) (Lesson #3, Slides 49-51):**
   a. A sufficient condition to be a chicken is to walk and talk like a duck. (Note, you will find it helpful to reorder the statement to be in the form ***p is a sufficient condition for q***)
   b. A necessary condition for this computer to run is that the computer has power. (Note, you will find it helpful to reorder the statement to be in the form ***p is a necessary condition for q***)

7. **Use modus ponens or modus tollens to fill in the blanks in the arguments so as to produce valid inferences. Indicate if you applied modus ponens or modus tollens to produce the valid inference (2 pts) (Lesson #3, Slides 59-63).**

   c. If Michele was unsure of the time of the dinner, then she would have called Karen.

   _____

   ∴ Michele was sure of the time of the dinner.

   d. If integer z is less than every positive integer, then it is less than or equal to zero.

   _____

   ∴ Integer z is less than or equal to zero.

8. **Use truth tables to determine whether the argument form is valid. Indicate which columns represent the premises and which represent the conclusion, identify the critical rows, and include a sentence explaining how the truth table supports your answer. Your explanation should show that you understand what it means for a form of argument to be valid or invalid (3 pts) (Lesson #3, Slides 53-57, 59-60, 79, 81, 86).**

   $a \rightarrow b$
   $b \rightarrow c$
   $\therefore a \rightarrow c$

9. **Use symbols to write the logical form of the argument below, and then use a truth table to test the argument for validity. Indicate which columns represent the premises and which represent the conclusion, identify the critical rows, and include a few words of explanation showing that you understand the meaning of validity (4 pts) (Lesson #3, Slides 53-57, 59-60, 79, 81, 86).**

   Sidney is a hockey player **and** Sidney is a coach.
   If Sidney is a hockey player, then Sidney is required to wear skates.
   ∴ Sidney is a coach **and** Sidney is required to wear skates.

Before handing in this assignment, make sure you have provided references for your answers to each question ONLY if you used another source other than the textbook as your source of inspiration to answer your question.

WHAT TO HAND IN

You should hand in:

- a **cover page** showing your name and student number, the course number (INFO 1214), your section number (S12 or S13), the assignment number (Assignment #2) and the date the assignment is actually submitted, all centered horizontally on the page;
- the answers to the questions, in the order given above

DUE DATE

S12: Wednesday Jan 24, 2024 at 1 pm (beginning of class)
S13: Friday Jan 26, 2024 at 1 pm (beginning of class)

NOTE: Late submissions are not accepted for this assignment – this allows me to post the answer key to Assignment #2 in time for Quiz #1