
DEPARTMENT OF COMPUTER SCIENCE & SOFTWARE ENGINEERING
COMP5361 DISCRETE STRUCTURES AND FORMAL LANGUAGES
WINTER 2021

Programming Assignment 2. Due date: March 3

1. Write a Python program that takes as input a truth assignment \mathcal{A} for propositional variables $\mathcal{P} = \{P1, P2, \dots, Pn\}$ and a propositional sentence \mathcal{S} involving these variables, and produces output **True** or **False**, depending on whether the given assignment \mathcal{A} satisfies the sentence \mathcal{S} or not. To show that your program works, run your program on the following input

$$\left((P1 \wedge P2) \vee (P3 \wedge \text{True}) \right) \vee \left((\neg P1 \wedge \neg P3) \wedge P2 \right).$$

Note that your program should work for any $n \geq 1$, and other inputs also will be given as tests.

2. Write a Python program that takes input \mathcal{P} and \mathcal{S} as in Question 1, generates the truth table for \mathcal{S} , and outputs **Tautology**, **Contingency**, or **Contradiction**, depending on which category \mathcal{S} falls into. To show that your program works, run your program on the following inputs

(a) $\left(\neg P1 \wedge (P1 \vee P2) \right) \rightarrow P2$

(b) $P2 \wedge (P1 \rightarrow \neg P2) \wedge (\neg P1 \rightarrow \neg P2)$

(c) $\left(P1 \rightarrow (P2 \rightarrow P3) \right) \rightarrow \left((P1 \rightarrow P2) \rightarrow P3 \right)$

Input/Output format

The input/output format is up to the student. You may take and show the information in any format you want. For example, you may use “OR,” “V”, etc. to represent logical disjunction.

The input/output streams is up to the student as well. For example, you may read from `sys.stdin` or from a file.

Use of libraries and some built-in python functions

- The use of any regular expression engine is not allowed (unless you implement it.) You may, however, use very simple such functions, like the `split()` function.
- The use of any parser / evaluator such as the `eval()` function is not allowed, unless you implement it.
- Any other function, whether built-in or not, that directly simplifies the assignment is not allowed.

What to submit

Using the Moodle system, submit a .zip file that includes:

1. Source code, please submit *one* .py file.
2. A .pdf file, explaining your format and how to run your code in few lines.
3. Four screenshots, showing the results of all the four inputs given in this assignment.

The format to be followed for submission file is :

`<yourname>_passign2_<student-id>.zip`

How to prepare for the demo

You will have to demonstrate your program in a one to one zoom meeting (the date of which will be announced) and your program will be tested using other test cases.

1. Correctness of the program : 30%
2. Valid input and output cases passed : 40%
3. Comprehension of the written program : 20%
4. Understanding of the problem statement 10%