

CMSC 2123 Discrete Structures

Project 1

Assignment: Determine whether each of the following logic expressions is a contingency, a contradiction or a tautology.

1. $(p \vee q) \wedge (\neg p \wedge \neg q)$
2. $(p \leftrightarrow q) \wedge (\neg p \leftrightarrow \neg q)$
3. $(p \vee q) \wedge (\neg p \vee r) \rightarrow (p \vee r)$
4. $((p \rightarrow q) \rightarrow r) \leftrightarrow (p \rightarrow (q \rightarrow r))$

Your program must **compute** the truth values based on the operators and build a truth table for each expression.

Program Files: Project 1 consists of the file **p01.cpp**. The file name for this project should be exactly as given. The project 1 file must be stored in **a new directory named p01 under your home directory of your account on our server**, i.e., the path for the project file should be **"~/p01/p01.cpp"** where **"~"** is your home directory.

File	Description
p01.cpp	File p01.cpp contains all the source code.

Command Line: To create folder p01 under your home repository, you can use:

```
$ mkdir p01
```

Regarding how to compile, you can try:

```
$ g++ -o p01 p01.cpp
```

Project 1 is invoked by simply typing:.

```
$ ./p01
```

Output Specifications: Let *Math* be a mathematical symbol and let *Prog* be the symbol that is displayed by project p01.

<i>Math</i>	<i>Prog</i>	<i>Math</i>	<i>Prog</i>	<i>Math</i>	<i>Prog</i>
\wedge	*	\vee	+	\neg	~
\oplus	^	\rightarrow	->	\leftrightarrow	<->
\equiv	===	<i>T</i>	<i>1</i>	<i>F</i>	<i>0</i>

(1). You don't need to list the result for all the operators. But at least the columns for single variables and the complete expression should be there. Please reference the "Sample Output" section.

(2). After the calculation of the truth table, please also make a conclusion whether this expression is a contingency, a contradiction or a tautology.

(3). Please use the right notation defined above to display the expressions. You can use any methods to **compute** the truth values.

(4). You **don't need to parse the expressions**, instead you can just hard code them in your program.

**Sample
Output:**

Check truth value for: $(p \rightarrow q) * (\sim p + q)$

p	q	$p \rightarrow q$	$\sim p + q$	$(p \rightarrow q) * (\sim p + q)$
0	0	1	1	1
0	1	1	1	1
1	0	0	0	0
1	1	1	1	1

$(p \rightarrow q) * (\sim p + q)$ is a contingency.

Submission

Please submit your report on D2L. This report should include a copy of your source code, and the result of a sample execution.

Please leave your source code on our server as described above in "Program Files" section.

This is a team work, you can have a partner and register on D2L. Please check D2L course homepage -> "Communication" -> "Groups" -> "ProjectGroups", and enroll yourself in a group.