An-Najah Nation University
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Computer Engineering Department
Discrete Mathematics (10636215)

HW 1

ILOs [3]	Due to 28/10/2022	10% points

In this assignment, you are asked to write a C++ code that decides whether a compound logical expression is Tautology, Contradiction or Contingency. The compound statement is formulated in Conjunctive Normal Form (CNF) or also known as Product of Sums (POS).

The general formula:
$(X_1 \vee X_2 \vee \cdots \vee X_n) \wedge (Y_1 \vee X_2 \vee \cdots \vee X_n) \wedge (X_1 \vee Y_2 \vee \cdots \vee X_n) \wedge (Y_1 \vee Y_2 \vee \cdots \vee X_n) \wedge \cdots \wedge (Y_1 \vee Y_2 \vee \cdots \vee Y_n).$

Examples:
$(\neg B) \wedge (\neg C)$
$(A \vee C) \wedge (B \vee C)$
$(A) \wedge (B \vee D) \wedge (B \vee E).$

It is required to make a menu list for some commands and keep it in infinite loop.
The required commands are:

1. Read expression from a file.
2. Check loaded expression. // result is one of three options above.
3. Display all assignments that makes the output TRUE.
4. Exit.

The format of the file as follows:
# of Variable
…..
# of Clauses
…….
Refer to Section 1.3 slide 20 example.

1. $(p \vee \neg q) \wedge (q \vee \neg r) \wedge (r \vee \neg p)$

"expression1.txt"
3 A B C 3 A or not B B or not C C or not A

2. $(p \vee \neg q) \wedge (q \vee \neg r) \wedge (r \vee \neg p) \wedge (p \vee q \vee r) \wedge (\neg p \vee \neg q \vee \neg r)$

"expression2.txt"
3 A B C 5 A or not B B or not C C or not A A or B or C Not A or not B or not C

Command line on screen example:

Please select from the following:
1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

1
Enter file name: expression1.txt
Loaded
Please select from the following:
1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

2
Contingency.
Please select from the following:
1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

3
A B C:
0 0 0
1 1 1
Please select from the following:
1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

5
Wrong option
Please select from the following:
1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

1
Enter file name: expression2.txt

Loaded
Please select from the following:

1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

2
Contradiction
Please select from the following:

1. Read expression from a file.
2. Check loaded expression.
3. Display all assignments that makes the output TRUE.
4. Exit.

4
Bye