

# Assignment 1

Name: \_\_\_\_\_

Write or type solutions on a separate paper. If written, write legibly.

1. If

$A$  = you will study

$B$  = you will do work

$C$  = you will pass

, translate the following propositional wff into English statements.

$$[(A \vee B) \wedge (A \wedge B)' \rightarrow (C \vee C')] \wedge [(A \wedge B) \rightarrow C] \wedge [(A \vee B)' \rightarrow C']$$

2. Rewrite each statement into a propositional wff. Indicate what each statement letter represent.

a) Pine trees are tall and prickly.

b) Mary will come to the party if and only if John goes to the party.

3. Write the truth table for each of the following propositional wff.

a)  $A \rightarrow B \leftrightarrow A' \vee B$

b)  $(A \vee B)' \leftrightarrow A' \wedge B'$

4. Rewrite the code below including the definitions of the function prototypes

```
#include <iostream>
#include <iomanip>
#include <string>
#include <sstream>
using namespace std;

bool conjunction(bool,bool);
bool disjunction(bool,bool);
bool negation(bool);
bool implication(bool,bool);
bool equivalence(bool,bool);

char btoc(bool value)
{
    return (value)?('T'):( 'F');
}

string truthTable();

int main()
{
    cout << truthTable() << '\n';
    return 0;
}
```

The functions `conjunction()`, `disjunction()`, `negation()`, `implication()`, and `equivalence()` should return the truth value of the conjunction, disjunction, negation, implication and equivalence connectives respectively. The functions `truthTable()` return a formatted string of a truth table that consists of all the connectives like the one on the formula sheet. Use the symbols `&`, `|`, `!`, `>` and `=` to represent conjunction, disjunction, negation, implication and equivalence in the tables respectively.

[Extra Credit](#) Prove or disprove that the wff

$$A \vee B \rightarrow (B' \rightarrow A)$$

is a valid argument by using a truth table, the Tautology Test and the derivation rules.