HOMEWORK 00

Task 1

1. Which of the following sentences are statements?

a. The moon is made of green cheese.

b. He is certainly a tall man.

c. Two is a prime number.

d. The game will be over by 4:00.

e. Next year interest rates will rise.

f. Next year interest rates will fall.

g. $x^2 - 4 = 0$

2. What is the truth value of each of the following statements?

a. 8 is even or 6 is odd.

b. 8 is even and 6 is odd.

c. 8 is odd or 6 is odd.

d. 8 is odd and 6 is odd.

e. If 8 is odd, then 6 is odd.

f. If 8 is even, then 6 is odd.

g. If 8 is odd, then 6 is even.

h. If 8 is odd and 6 is even, then $8 < 6$.

3. Given the truth values A true, B false, and C true, what is the truth value of each of the following wffs?

a. $A \wedge (B \vee C)$

b. $(A \wedge B) \vee C$

c. $(A \wedge B)' \vee C$

d. $A' \vee (B' \wedge C)'$

4. Given the truth values A false, B true, and C true, what is the truth value of each of the following wffs?

a. $A \rightarrow (B \vee C)$

b. $(A \vee B) \rightarrow C$

c. $C \rightarrow (A' \wedge B')$

d. $A \vee (B' \rightarrow C)$

5. Rewrite each of the following statements in the form "If A, then B."

a. Healthy plant growth follows from sufficient water.

b. Increased availability of information is a necessary condition for further technological advances.

c. Errors were introduced only if there was a modification of the program.

d. Fuel savings implies good insulation or storm windows throughout.

6. Rewrite each of the following statements in the form "If A, then B."

a. Candidate Lu winning the election will be a sufficient condition for property taxes to increase.

b. The user clicks Pause only if the game level changes.

c. The components are scarce, therefore the price increases.

d. Healthy hair is a necessary condition for good shampoo.

7. Common English has many ways to describe logical connectives. Write a wff for each of the following expressions.

a. Either A or B

b. Neither A nor B

8. Common English has many ways to describe logical connectives. Write a wff for each of the following expressions.

a. B whenever A

b. A is derived from B

c. A indicates B

d. A exactly when B

9. Several forms of negation are given for each of the following statements. Which are correct?

a. The answer is either 2 or 3.

1. Neither 2 nor 3 is the answer.
2. The answer is not 2 or not 3.
3. The answer is not 2 and it is not 3.

b. Cucumbers are green and seedy.

1. Cucumbers are not green and not seedy.
2. Cucumbers are not green or not seedy.
3. Cucumbers are green and not seedy.

c. $2 < 7$ and 3 is odd.

1. $2 > 7$ and 3 is even.
2. $2 \geq 7$ and 3 is even.
3. $2 \geq 7$ or 3 is odd.
4. $2 \geq 7$ or 3 is even.

10. Several forms of negation are given for each of the following statements. Which are correct?

a. The carton is sealed or the milk is sour.

1. The milk is not sour or the carton is not sealed.

2. The carton is not sealed and also the milk is not sour.

3. If the carton is not sealed, then the milk will be sour.

b. Flowers will bloom only if it rains.

1. The flowers will bloom but it will not rain.

2. The flowers will not bloom and it will not rain.

3. The flowers will not bloom or else it will not rain.

c. If you build it, they will come.

1. If you build it, then they won’t come.

2. You don’t build it, but they do come.

3. You build it, but they don’t come.

Task 2

In C++ and Python (main.cpp and main.py):

- Create 3 separate functions that display the truth tables for AND, OR, and Implication ($\rightarrow$).
- The output for each function should be as follows:

```
A | B | A AND B
--------------
0 | 0 |     0
0 | 1 |     0
1 | 0 |     0
1 | 1 |     1
```

```
A | B | A OR B
--------------
0 | 0 |    0
0 | 1 |    1
1 | 0 |    1
1 | 1 |    1
```

```
A | B | A -> B
--------------
0 | 0 |    1
0 | 1 |    1
1 | 0 |    0
1 | 1 |    1
```