**LAB #3**

**CS 2510 GUILTY-INNOCENT EXAMPLE –**

*Given the following evidence prove that the client is innocent.*

If my client is guilty, then the knife was in the drawer. Either the knife was not in the drawer or Jason saw the knife. If the knife was not there on October 10, it follows that Jason didn’t see the knife. Furthermore, if the knife was there on October 10, then the knife was in the drawer and also the hammer was in the barn. But we all know that the hammer was not in the barn. Therefore, ladies and gentlemen of the jury, my client is innocent.

1. **Define propositions:**

G = my client is guilty, G' = my client is innocent;

K = knife was in the drawer, K'=knife was not in the drawer;

J = Jason saw the knife, J'= Jason didn’t see the knife;

O = knife was there on October 10th, O'= knife was not there on October 10th;

H = hammer was in the barn, H'= hammer was not in the barn.

1. **Translate hypotheses from English into Logic** (so, write them in propositional form)

WE ARE GIVEN 5 HYPOTHESES/PREMISES:

1. If my client is guilty, then the knife was in the drawer. **G ⇾ K**

2. Either the knife was not in the drawer or Jason saw the knife. **K' ∨ J**

3. If the knife was not there on Oct 10, it follows that Jason didn't see it. **O' ⇾ J'**

4. If knife was there on Oct 10, then knife was in drawer and hammer was in the barn.   
**O ⇾ (K ∧ H)**

5. But we all know that the hammer was not in the barn. **H'**

1. **Translate the conclusion from English into Logic**

Our goal is to prove: “Therefore, ladies and gentlemen of the jury, my client is innocent”. **G'**

1. **Write down whole logical argument**:

**Logical argument** is:(G ⇾ K) ∧ (K' ∨ J) ∧ (O' ⇾ J') ∧ (O ⇾ (K ∧ H)) ∧ H' ⇾ G'

1. PROOF:

First, write down given 5 premises/hypothesis:

**Step Reason**

1. G ⇾ K hypotheses

2. K' ∨ J hypotheses

3. O' ⇾ J' hypotheses

4. O ⇾ (K ∧ H) hypotheses

5. H' hypotheses

6. O ⇾ (H) 4, simplification

7. O’ 5,6 modus tollens

8. J’ 3,7 modus ponens

9. J v K’ 2, commutative

10. K’ 8,9, disjunctive syllogism

11. G’ 1, 10 modus tollens