**GET1028 Cheatsheet**

**Proposition**

An indicative statement which conveys **information, fact, or description.** It is either true or false.

**Deductive / Valid argument**

An argument that its conclusion can’t be false if the premises are true

**Soundness (Reliability)**

An argument is sound if it is valid **and** all its premises are true

**Inductive Argument**

An **invalid** argument whose premise set supports or confirms it conclusion.

**Tautology**

A proposition that is **always true** for all possible combinations of truth value.

**Contradiction**

A proposition that is **always false.**

The number of combinations of the truth values of a set of N atomic propositions is **2n**.

1. An **iff** statement is **only true** if **both are false** or **both are true.**

2. (D A) = (~A ~D) (contrapositive law)

3. (~P Q) = (P V Q)

(P Q) = (~P V Q)

**3**. (P Q) = (P Q) & (Q P)

~ (P Q) = (P V Q) & ~(P.Q)

3. **Truth assignment test:**

First assign true to all premises and false to conclusion. Then see if it is possible to get such scenario or not by working out the truth values of the atomic propositions and see if it is possible to get a set of truth values of the atomic propositions that lead to such scenario.

4. **Translation**

**\*** and = but, yet, however, although

\* unless = if not = or

\* the part immediately after **only if** = consequent

\* just if == iff

P is a **sufficient** condition for Q

: if P then Q

P is a **necessary** condition for Q

If Q then P

P is a **necessary** and **sufficient** condition for Q

P iff Q

**Keywords to identify premises & conclusions**

**Premise**

Because, for, since, after all, I assume that

, as we know, for these reasons

**Conclusion**

Hence, thus, so, therefore, It must be, it can’t be, This proves / shows that

***Quantificational Logic***

1. All P are Q = (x)(Px Qx) {only use for All .. are…, not for no … are…}

All are R = (x)Rx Not all = ~(x)

2. No P = ~(∃x)Px

3. **Reverse Squiggles**

~(x)Lx -> (∃x)~Lx

~(∃x)Lx -> (x)~Lx

\*Can only apply this rule if the negated quantified statement is **the outermost** wff

4. **Drop Existentials & Universals**

(∃x)Px -> Pa // can only be used once, need to

use **new** constants afterwards

(x)Bx -> Ba // can be used multiple times, use

the old constants

**Additional Steps in quantificational proof**

1. Reverse squiggles (mark the line)

2. Drop existentials (**mark the line**)

3. Drop universals (don’t mark the line)

\*Don’t switch the order above!

\*Always use a **new constant** when applying **drop existential**, whereas use back old constants for drop universals. (However, for **drop universal**, it’s not wrong to use completely new constant; it’s just inefficient.)

**Refutation in quantificational proof**

1. **existential wff** -> is true if it is true in **at least**

**one case**

2. **universal wff** -> is true if it is true in **all** cases

\*The above is the truth assignment test right before the refute step