Unit 1

Practice I

Introduction to logics

1) Mark the link terms (if any) in the following propositions. Find how many atomic propositions are found in each molecular proposition. Recall that << if ..., then >> is a single link term.

   Example:

   If I stay up late editing assignments then *I will be tired tomorrow morning*

   The statement has two atomic propositions: "I stay up late editing assignments" and "I will be tired tomorrow morning". The link term is highlighted in red.

   1. This is not my happy day.
   2. Winter has come and days are shorter.
   3. Many germs are not bacteria.
   4. If there are flaws in large rock masses, then earthquakes may occur.
   5. If it is a positive number then it is greater than zero.
   6. If x > 0 then y = 2
   7. If x + y = 2 then z > 0
   8. x = 0 or y = 1
   9. If x = 1 o z = 2 then y > 1
   10. If z > 10 then "x + z > 10" and "y + z > 10".
   11. x + y = y + x

2) Recognize the propositional structure of each sentence below, to do so underline the atomic propositions, mark the link terms and group them into molecules.

   Example:

   If I play my music loud my neighbor will complain

   p = I play my music loud
   q = my neighbor will complain

   $p \rightarrow q$

   1. The meal will be today at three o'clock.
   2. The big black bear walked lazily down the road.
   3. The music is very soft or the door is closed.
   4. This big dog likes to hunt cats.
   5. He asks for his pipe and asks for his bowl.
   6. If John is a good player, then he will participate in the school team.
   7. Older students are not on the list before young people.
   8. x + y > 2
   9. x = 1 or y + z = 2
   10. y = 2 and z = 10
   11. A better world has no pollution
   12. Democracy only exists if and only if there are elections and the elections are fair
   13. To defeat Voldemort, Harry needs to destroy the Horcruxes.
   14. To defeat Voldemort, Harry destroyed the Horcruxes.
   15. If I collect wood then I can build a ship and thus sail across the Atlantic.
   16. Since I collect wood then I can build a boat and, if I build a boat then I sail to the other side of the Atlantic.
   17. John is here and Mary has left.
   18. If x + 1 = 10 then x = 9.
   19. Mary is not here or John has left.
   20. If x = 1 or y = 2 then z = 3.
   21. If Peter is at home or John is in the courtyard, then Joseph is innocent.
   22. y = 0 and x = 0
   23. Doesn't happen that 6 = 7
   24. Doesn't happen that if x + 0 = 10 then x = 5.

3) Let p, q, r, s, t, m, n and v be atomic propositions, to which I assign the following sentences.

p: John traveled in the 8 A.M plane.
q: Peter arrived on time to the airport.
r: The project was presented to the board of directors.
s: The flight was delayed
t: Peter travels on the plane
m: “x + y = 0”; n: “x = 2”; v: “y = -2”

Interpret the molecular propositions formed. That is, express in natural language the following propositions. Group by using parentheses to better recognize the precedence of operators and form a sentence.

Example:

r → ~s

If the project was presented to the board of directors then the flight was not delayed

1. q → ~p
2. (p ^ s) → t
3. ~q → (~r ^ ~p)
4. (n ^ ñ) → n **This is a tricky one*