Homework 1
Mathematical foundations of informatics (I201, 2008)

(This HW will be collected on 9/10 Wed. in the class. Write LEGIBLY and explain your answers clearly. The homework you hand in must be your own work, IN YOUR OWN WORDS and your own explanation. **NO Late homework will be accepted.**)

1. (10 pts) Which of the following sentences are propositions?
(1) John and Mike are good friends.
(2) The snow is black.
(3) Y is an integer.
(4) Do we have class tomorrow?
(5) New York is the capital city of the United States.
(6) 3 × 4 = 12.
(7) Peter is not bad.
(8) Please turn off the computer when you leave.
(9) Phelps won 8 gold metals in the 2008 Olympic games.
(10) Kate is either sick or pretending to be sick.

2. (20 pts) Translate the following propositions into formula. Write down the atomic propositions and use appropriate connectives.

Example: Jack is the champion of either swimming or running.
P: Jack is the champion of swimming;
Q: Jack is the champion of running.
Formula: P ∨ Q;

(1) John is either in the dorm or in the library;
(2) If I will go outside, I will buy some books, unless I am tired;
(3) Mary is a graduate student in computer science, born in 1981 or 1982.
(4) You stay in either room 203 or 204 tonight.
(5) If blood is white, Peter will pass the exam.

3. (8 pts) Which are not formulae in proposition logic.
(1) P → ∧q
(2) (p → q) ∧r
(3) ¬¬p ∧¬q
(4) ∧ (p ∧ q)

4. (12 pts) If p: 2+2=4; q: the moon is smaller than the earth; r: Pure water is yellow. What are the truth values for the formulae below?
(1) $((\neg p \land q) \lor (p \land \neg q)) \to r$
(2) $(q \lor r) \to (p \to \neg r)$
(3) $(\neg p \lor r) \leftrightarrow (p \land \neg r)$