Week 1 MAT1348

A list of practiced problems will be posted each week. Each list will consist of:

1) A list of key words of the topics seen in class during that week.
2) A list of practiced problems on the topics seen in class. The list will consist of problems from the textbook and other problems not from the textbook. Please note that you shall not be at a disavantage if you do not practice the questions that are in the textbook. I remind you that the textbook is not recquired for this course.

Week 1: From January 6 to January 10

Topics of the week:

- Propositions
- Truth assignment
- Truth table
- Logical connectives:
  - negation of a proposition
  - conjunction
  - disjunction
  - exclusive or
  - implication
  - biconditional
- Compound proposition
- Tautology, contradiction

Exercices:

Compound Proposition:

1. Write the following compound propositions by using the appropriate logical connectives. For each question, define your primitive (atomic) propositions as well as the logical connectives used.

Here is an example: Consider the proposition: Fishes live in water and I do not live close to a river. We could say: p: Fishes live in water and q: I live close to a river. The proposition becomes p $\wedge\neg$ q.

a) My favorite team is the Montreal Canadians or I really like the Ottawa Senators.

b) It would be my pleasure to help a student if and only if the student is registered in my class.

c) If you do not study in computer science at the University of Ottawa you do not have to take the course MAT1348.

d) I will go for a walk in the woods tomorrow if and only if it is snowing tonight.

e) You like science but you do not like politics.

Truth table of a compound proposition:

2. Construct a table of truth for the following compounded propositions:

a) $(p \wedge (p \rightarrow q)) \rightarrow q$

b) $(p \rightarrow q) \rightarrow (q \rightarrow p)$

c) $(p \vee q) \wedge r$

d) $q \wedge (\neg r \rightarrow p)$

e) (p $\vee$ q) $\rightarrow$ ($\neg$ q $\wedge$ r)

f) $(q \longleftrightarrow p) \oplus (r \rightarrow p)$

Tautology, contradiction:

3. a) Use a truth table to verify that the implication $(p \wedge (p \rightarrow q)) \rightarrow q$ is a tautology.

b) Determine if $(\neg\ p \wedge (p \rightarrow q)) \rightarrow \neg\ q$ is a tautology, a contradiction or neither.

c) Determine if $p \wedge (\neg p \wedge q)$ is a tautology, a contradiction or neither.

Problems from the textbook:

Propositions: Problems 1 and 2 from Section 1.1 on page 13

Compound Proposition: Problems 10 to 17 from Section 1.1 on pages 14 and 15.

Truth Table of a Compound Proposition: Problems 33 to 39 from Section 1.1 on page 16.

Tautology, contradiction: Problems 11 and 12 from Section 1.3 on page 38.