Homework 1

Due Week 4

1. Using the definition of well formed propositional formulae (wffs), decide which of the following are propositional formulae:

   (a) $(((P \to Q) \vee S) \leftrightarrow T)$,
   (b) $((P \to (Q \wedge (S \to T))))$,
   (c) $(\neg(B(\neg Q)) \wedge R)$.

2. In practice, parantheses can be dropped, if there are no ambiguities. Moreover, a precedence for propositional connectives is defined: $\leftrightarrow, \to, \vee, \wedge, \neg$ ($\neg$ binds the strongest). For the following, decide which are wffs (in the relaxed sense). For those that are wffs, place the parantheses in the appropriately, such that the formula is a wff in the strong sense, then give the formula tree (the abstract syntax):

   (a) $P \wedge Q \to R\neg B \vee G$,
   (b) $P \to \neg\neg\neg\neg\neg B \leftrightarrow Q \wedge S$.

3. Translate the following text into propositional formulae:

   "If Superman were able and willing to prevent evil, he would do so. If Superman were unable to prevent evil, he would be impotent; if he were unwilling to prevent evil, he would be malevolent. Superman does not prevent evil. If Superman exists, he is neither impotent nor malevolent."