1. Indicate, by putting an “X” in the proper blank, whether the following expressions are syntactically correct according to the syntax of Propositional Logic given in lecture.

   (a) (1) Is______ Is Not______  $(P \Rightarrow \neg Q) \lor (\neg Q \Rightarrow P)$
   (b) (1) Is______ Is Not______  $(P \land Q \land R) \Rightarrow Q$
   (c) (1) Is______ Is Not______  $((P \land Q) \land R) \Leftrightarrow [P \land (Q \land R)]$
   (d) (1) Is______ Is Not______  $\neg (Tom \ drives \ Betty) \Rightarrow Tom \ is \ the \ driver$
   (e) (1) Is______ Is Not______  $Tom \ drives \ Betty \Rightarrow Betty \ is \ the \ driver$
2. Using the following atomic propositions, with the given intensional semantics:

- \([Io is a moon of Jupiter]\) = Io is a moon of Jupiter.
- \([Io is large]\) = Io is large.
- \([Io is cold]\) = Io is cold.
- \([Io is far from the Sun]\) = Io is far from the Sun.

Formalize the following sentences as well-formed propositions of Propositional Logic.

(a) (3) If Io is far from the Sun, then Io is cold.

(b) (3) If Io is cold, Io is not large.

(c) (3) Io is a large cold moon of Jupiter.

(d) (3) Io is far from the Sun, but is not cold.