## Problem Set 09: GPL Trees (Answers)

- 1. Use a tree to test whether the following is a tautology. If it is not, then read a countermodel off the tree.
  - (a)  $(Gaa \lor \exists x(Gxx \leftrightarrow Gxb))$
  - (b) Answer:

$$\neg (Gaa \lor \exists x (Gxx \leftrightarrow Gxb)) \checkmark \\ \neg Gaa \\ \neg \exists x (Gxx \leftrightarrow Gxb) \checkmark \\ \forall x \neg (Gxx \leftrightarrow Gxb) \checkmark \land ab \\ \neg (Gaa \leftrightarrow Gab) \checkmark \\ Gaa \qquad \neg Gaa \\ \neg Gab \qquad Gab \\ x \qquad \neg (Gbb \leftrightarrow Gbb) \checkmark \\ Gbb \qquad \neg Gbb \\ \neg Gbb \qquad Gbb \\ x \qquad x$$

- 2. Use a tree to test whether the following propositions are jointly satisfiable. If they are not, then read a countermodel off the tree.
  - (a)  $\neg(Lab \leftrightarrow Kbc)$ ,  $(\forall yLcy \land Kca)$
  - (b) Answer: