Due Date: November 19

   (You are asked to give all states where the formulas are true, not just
determine if the formula is true in the initial state.)

2. Baier and Katoen, Exercise 6.4, Parts e.g.h.k.o.
   (If you determine that a pair of formulas is not equivalent, give a particular
choice of \( \Phi \) and \( \Psi \) and a particular transition system that shows that the
two formulas are not equivalent. If you determine that a pair is equivalent,
you do not need to justify your answer.)

3. Let \( \Phi \) be the following formula:

   \[
   \neg \forall (\neg (a \land b) U \neg \forall c)
   \]

   (a) Put \( \Phi \) into ENF.
   (b) Put \( \Phi \) into PNF.

4. Extra Credit: In class we defined a Hamilton path for a directed graph
   \( G \) to be a path \( \langle v_1, \ldots, v_n \rangle \) of \( G \) such that every vertex appears exactly
once. If the Hamilton path satisfies the additional property that there
is an edge from \( v_n \) to \( v_1 \), then the path is called a Hamilton cycle. The
Hamilton cycle (HC) problem is: Given a directed graph \( G \), does \( G \) have
a Hamilton cycle.

   Give a polynomial time reduction of HC to \( 3-LTL-MC \), i.e., show how
in polynomial time you can transform a directed graph \( G \) into a transition
system \( T \) and an LTL-formula \( \varphi \) such that \( G \) has a Hamilton cycle if and
only if there is a path \( \pi \) of \( T \) such that \( \pi \models \varphi \).