Homework 1

Section 1.1

14. Let $p$, $q$, and $r$ be the propositions
   $p$: You get an A on the final exam.
   $q$: You do every exercise in this book.
   $r$: You get an A in this class.

   Write these propositions using $p$, $q$, and $r$ and logical connectives (including negations).
   a) You get an A in this class, but you do not do every exercise in this book.
   b) You get an A on the final, you do every exercise in this book, and you get an A in this class.
   c) To get an A in this class, it is necessary for you to get an A on the final.
   d) You get an A on the final, but you don’t do every exercise in this book; nevertheless, you get an A in this class.

24. Write each of these statements in the form “if $p$, then $q$” in English. [Hint: Refer to the list of common ways to express conditional statements provided in this section.]
   a) I will remember to send you the address only if you send me an e-mail message.
   b) If you keep your textbook, it will be a useful reference in your future courses.
   c) That you get the job implies that you had the best credentials.

32. Construct a truth table for each of these compound propositions.
   b) $p \leftrightarrow \neg p$
   d) $(p \land q) \rightarrow (p \lor q)$
   e) $(q \rightarrow \neg p) \leftrightarrow (p \leftrightarrow q)$

Section 1.3 (show the prove of 22 without using truth tables)

14. Determine whether $(\neg p \land (p \rightarrow q)) \rightarrow \neg q$ is a tautology.

22. Show that $(p \rightarrow q) \land (p \rightarrow r)$ and $p \rightarrow (q \land r)$ are logically equivalent.

30. Show that $(p \lor q) \land (\neg p \lor r) \rightarrow (q \lor r)$ is a tautology.