CMPT285 Homework 1 (due Tuesday, Feb. 4)

1. (Problem 1 on page 12 from Rosen) Which of these statements are propositions? What are the truth values of those that propositions?

   - Boston is the capital of Massachusetts.
   - Miami is the capital of Florida.
   - $2 + 3 = 5$.
   - $5 + 7 = 10$.
   - $x + 2 = 11$.
   - Answer this question.

2. (Problem 17 on page 14 from Rosen) Determine whether each of these conditional statements is true or false.

   - if $1 + 1 = 2$, then $2 + 2 = 5$.
   - if $1 + 1 = 3$, then $2 + 2 = 4$.
   - if $1 + 1 = 3$, then $2 + 2 = 5$.
   - if monkeys can fly, then $1 + 1 = 3$.

3. (Problem 37 on page 15 from Rosen) Construct a truth table for each of the following:

   - $p \to (\bar{q} \vee r)$
   - $\bar{p} \to (q \to r)$
   - $(p \to q) \vee (\bar{p} \to r)$
   - $(p \to q) \wedge (\bar{p} \to r)$
   - $(p \leftrightarrow q) \vee (\bar{q} \leftrightarrow r)$
   - $(\bar{p} \leftrightarrow \bar{q}) \leftrightarrow (q \leftrightarrow r)$

4. (Problem 9 on page 35 from Rosen) Show that each of these conditional statements is a tautology by using truth tables.

   - $(p \wedge q) \to p$
   - $p \to (p \vee q)$
   - $\bar{p} \to (p \to q)$
   - $(p \wedge q) \to (p \to q)$
   - $\overline{(p \to q)} \to p$
   - $\overline{(p \to q)} \to \bar{q}$

5. (Problem 27 on page 35 from Rosen) Show that $(p \leftrightarrow q)$ and $(p \to q) \wedge (q \to p)$ are logically equivalent.

6. (Problem 31 on page 35 from Rosen) Show that $(p \to q) \to r$ and $p \to (q \to r)$ are not logically equivalent.