HOMEWORK 4
DISCRETE MATHEMATICS I
DUE 01-31

Show your work!

(1) This problem explores what would happen if we changed our agreement that $\mathbf{F} \to q$ is always true.
   (a) Imagine a statement $p \mapsto q$ whose truth table is like that of $p \to q$, except that it is false whenever p is false. Find a statement using only $\neg$, $\vee$, and $\wedge$ that is logically equivalent to $p \mapsto q$. (You may not need to use all connectives.)
   (b) Imagine a statement $p \rightsquigarrow q$ whose truth table is like that of $p \to q$, except that it is false when p and q are both false. Find a statement using only $\neg$, $\vee$, and $\wedge$ that is logically equivalent to $p \rightsquigarrow q$. (You may not need to use all connectives.)

(2) The statements $p \leftrightarrow q$ and $p \oplus q$ are not logically equivalent, but there is a relationship between their truth tables.
   (a) In words, what is the relationship?
   (b) Express the relationship as a logical equivalence.

(3) (a) Are $p \to q$ and $q \to p$ logically equivalent?
   (b) Find another conditional statement involving p and q that is logically equivalent to $p \to q$.

- **Eight** book problems: #1.2.16, 20, 29, 33, 35, 45, 46, 47.