Please upload your assignment to Moodle by Wednesday, and also bring a paper copy to class on next day. This assignment will be graded anonymously, so please don't list your name, but only your MAC ID.

As noted by the syllabus as well as in class, the scope and content of assignments are set by lectures, instead of any specific textbook. Please beware that different textbooks may use different symbolism or definitions. Lemmon's as a very old textbook, for example, uses soundness and validity differently from the lectures.

Assignments are meant to be challenging! You are encouraged to discuss your answers with other students (but write up your own answers individually).

Assignments are meant to be challenging! It's okay if you don't know the answers right away. In that case, **first look at your class notes, notes posted in the shared folder, or textbooks**. Try different answers to see if anything works. You are encouraged to discuss your answers with other students (but write up your own answers individually).

1. (1 point) Match concepts in the first column with terms in the second column. Note that a concept may have more than one match, and some concept may not have any match.

Arguments	
Propositions	True or false
Declarative sentences	Sound or unsound
Sentential variables	Have truth values
Phrases (incomplete sentences)	Valid or invalid
Sentential expressions	

2. (2 points) Express the following texts as sentential expressions using sentential variables and connectives that we have learned (that is, negation, conjunction, and disjunction). Also explain what each sentential variable represents; for example, A: Alex is happy. Indicate relevant ambiguities, as you find them, and formalize each of the readings.

(1) The telephone is disconnected.

(2) Charles is rich but he's not happy; Charles wants to be happy.

(3) Democracy is a form of government which may be rationally defended, not as being good, but as being less bad than any other.

(4) Neither Zoey nor I are knaves.

(5) At least two of Ann, Barbara and Claire are unmarried.

(6) Ulysses, who is crafty, is from Ithaca.

(7) Ulysses, who isn't crafty, is from Ithaca.

(8) Ulysses, who is crafty, isn't from Ithaca.

(9) Ulysses isn't both crafty and from Ithaca.

(10) Ulysses is not both from Ithaca and Troy, though he is crafty.

3. (0.9 points) Make truth tables for the following complex sentences. Please make sure you list all the intermediate steps.

(1) ¬(P ^ ¬P)

(2) ¬P v ¬Q

(3) P ^ (Q ^ R)

4. (1.1 points) Suppose that $\vee^x$ is a connective that corresponds to exclusive 'or' (i.e., A $\vee^x$ B is true just when one of A and B is true, but not both.) Show that disjunction can be expressed using $\wedge$ and $\vee^x$ (without using negation); in other words, using only $\wedge$ and $\vee^x$, construct a sentence whose truth-table column is exactly that of A $\vee$ B. (This is easier than it looks.)

It's recommended that you list both the truth tables, so even if your final result is not fully correct, you might still be able to receive partial credit.