MATH 2513   **Homework 2**   **Due 1/31/19 (Thursday)**

Please explain briefly but clearly your reasoning (unless it is totally obvious from your answer, i.e., when you have to list the elements of a set or to draw a set in the plane).

Please write the problems in the same order as they are given in the assignment.

Note that the odd-numbered problems have answers at the end of Hammack's book. I strongly suggest that you do *all* odd-numbered problems for practice; moreover, many of them are very similar to the assigned homework problems.

Hammack, Section 1.6: Exercises 2(a,f,g,i), 6.

Hammack, Section 1.7: Exercises 12, 14.

Hammack, Section 1.8: Exercises 6, 8, 10 (draw a sketch), 12, 14.

Hammack, Section 2.2: Exercises 6, 8.

Hammack, Section 2.3: Exercises 4, 6, 10.

Hammack, Section 2.4: Exercise 4.

Hammack, Section 2.5: Exercises 8, 10.

Hammack, Section 2.6: Exercises 10 (do it with a truth table and with using the laws), 12.

Additional problem. Define the operation ∇ by the following truth table.

P	Q	$P\nabla Q$
T	T	F
T	F	F
F	T	F
F	F	T

(a) Use a truth table to show that $P\nabla P$ is logically equivalent to $\sim P$.

(b) Complete a truth table for $(P\nabla P)\nabla(Q\nabla Q)$.

(c) Which of the statements $P \wedge Q$, $P \vee Q$, $P \Rightarrow Q$, $P \Leftrightarrow Q$ is logically equivalent to $(P\nabla P)\nabla(Q\nabla Q)$?

(d) The operation ∇ can easily be expressed in terms of $\wedge$, $\vee$, and $\sim$. How? Justify your claim.