MATH 130: STUDY GUIDE FOR QUIZ 1

- **Concepts.** Know the meaning of logical concepts we've studied such as equivalence, validity, tautology, contradiction, etc. Expect to be asked to write a definition in ordinary language.
- **The logic.** Be able to translate between natural language and the language of logic.
- **Truth tables and Venn diagrams.** Know how to construct truth tables for sentences. Know how to translate between truth tables and Venn diagrams. Know how to use truth tables to get information about sentences.

Note Sheet

For the quiz you are allowed a single sheet of paper (standard 8.5 by 11 size, front and back) for notes to reference during the quiz. Here's some suggestions for what to put on your note sheet.

- Any definitions you don't feel you have confidently memorized.
- The truth tables for the logical connectives.
- Short descriptions of the algorithms/processes used to check different properties.
- A reminder that you've got this and will ace the quiz.

Sample questions

See the unit 1 worksheets for examples of the sorts of questions to expect. Here are a few more.

(1) Use the following symbolization key:

D	The Detective will solve the crime.
P	Poems by Alejandra Pizarnik were found at the crime scenes.
R	Professor Rivera Garza is the murderer.
T	The Tabloid Journalist is the murderer.

Translate the following English sentences into logic.
   (a) Either Professor Rivera Garza is the murderer or else the Tabloid Journalist is.
   (b) If poems by Alejandra Pizarnik were found at the crime scenes then the Detective will solve the crime.
   (c) If neither Professor Rivera Garza nor the Tabloid Journalist were the murderer then the Detective will not solve the crime.

(2) Using the same symbolization key, translate the following logical sentences into English.
   (a) $\neg D \wedge P \wedge T$.
   (b) $R \leftrightarrow \neg T$.
   (c) $\neg(D \vee R)$.

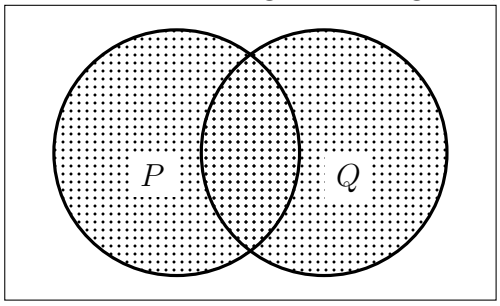
(3) Make truth tables for the following sentences.
   (a) $A \rightarrow \neg(B \vee A)$
   (b) $(A \rightarrow B) \vee (\neg A \rightarrow \neg B)$
   (c) $\neg A \wedge \neg B$

(d) $A \leftrightarrow (B \wedge \neg C)$

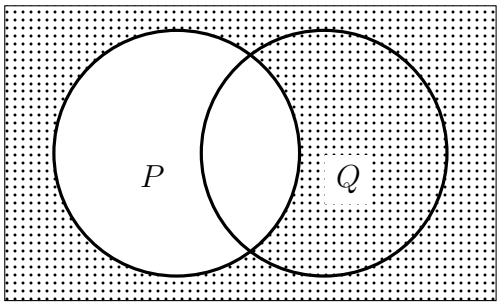
(4) For each of the truth tables from the previous problem, fill in the corresponding Venn diagram.

(5) For each of the following Venn diagrams, write the corresponding truth table.

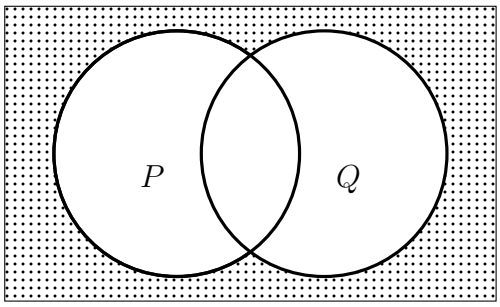
(a)



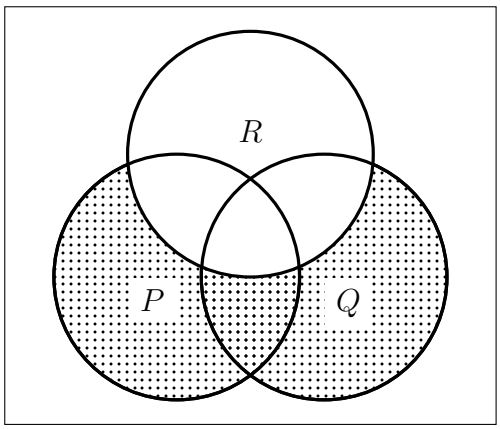
(b)



(c)



(d)



(6) Classify the following sentence as tautology, contradiction, or contingent. Write a sentence explaining your choice.

$$A \to A \vee B \to \neg B$$

(7) Are the following two sentences equivalent? Use truth tables to answer, and write a sentence to explain your answer.

$$\neg(A \wedge \neg B) \qquad \text{and} \qquad A \to B$$

(8) Is the following argument valid? Use truth tables to answer, and write a sentence to explain your answer.

$$\begin{aligned} \text{(Premise)} \quad & A \to \neg B \\ \text{(Premise)} \quad & \neg A \\ \text{(Conclusion)} \quad & B \end{aligned}$$