Math 308: Bridge to Advanced Mathematics
Problem Set due in class on Tuesday, March 5th.

Work on these problems and write down your thoughts, **even if you do not have a complete solution. Write clearly** enough for another student in this course, or for yourself in a year, to understand your work.

Rewrite each of the following statements in the form "If ..., then ..."
For example, "All blue monsters are scary" becomes "**If** a monster is blue**, then** this monster is scary."

1. G does not take bus 2 on a day when D does.
2. When A and F take the same bus, it is always bus 3.
3. This differential equation has the characteristic roots 1, 1, 2, 3, so all its solutions are to be found in the linear combination $y = ae^x + bxe^e + ce^{2x} + de^{3x}$ where a, b, c, and d are constants.
4. We cannot apply Equation (12.12) directly because the partial derivative $\frac{\partial F}{\partial z}$ is zero on the boundary of D.
5. Since A is a companion matrix, there are only two possible Jordan forms.
6. Two numbers are equal if their absolute values and their signs are equal.
7. For two functions to be different, it suffices that their output differs on one input.
8. Continuity is a necessary condition for differentiability.
9. It's only cold in winter in New York.

Now write the converse of each of those statements.
Now write the contrapositive of each of those statements.
Now write the converse of the contrapositive of each of those statements.
Now write the contrapositive of the converse of each of those statements.
[The first two are from `https://www.petersons.com/graduate-schools/sample-lsat-test-questions.aspx`; the next three are from various math books.]

General homework directions:

You may discuss homework problems with other students, and I encourage you to do so. However, write your solutions yourself: do not copy them word for word. Acknowledge your collaborators: write on the solutions you hand in "I worked with Jane Lee on problem 3, and with Jose Perez on problems 2a and 4."

If you do not know some of the words used on the homework, look them up before working on the problem: start with our textbooks, then try a dictionary or google. You may also use outside sources, such as books or websites, if you are stuck on a homework problem after at least 30 minutes of thought over at least two days. In any case, provide a traceable reference to your source(s); "wikipedia" or "a theorem in a number theory book" is not traceable; "the wikipedia page for `Equivalence_relation`" and "Theorem 3.7 on p.54 of Burton's Elementary Number Theory" are traceable.

Failing to acknowledge collaboration or outside sources is called plagiarism; it is a kind of cheating. Cheating is taken very seriously in US colleges. **If I find plagiarism in your problem sets, you will receive no credit and no feedback on problem sets for the rest of the semester.**