Since I didn't realize that the rooms for the discussion sections changed from what was originally on SPIRE, I told the TAs the wrong rooms. Thus one TA missed his first discussion section and the other TA was late for her first section. It's my fault and I apologize. For this reason, there will be no Moodle discussion quiz this week and no Moodle homework quiz this week. Those will both start next week. Below I simply explain how discussion sections work and what the questions were supposed to be. If you have already made progress solving them, then you are ahead of the game.

We will randomly break into groups of four, based on the card number you receive — all 1's together, all 2's togther, etc. This is important: you will meet other members of the class, often some in the group will know more than others or have different, useful ideas. Just breaking into the same groups of friends each week is **suboptimal**. If you are stuck in a "bad" group one week, it's only that week. Try to contribute and help your group.

In the following, please translate an English statement to formal math using quantifiers or a formal math statement to colloquial English, in which you make the idea of the statement clear. We will work all term on understanding math statements in English and on translating somewhat informal ideas in English into completely precise mathematical statements.

Example: (a true statement called the "triangle inequality")

English: "For any triangle drawn in the Eucildean plane, if we add together the lengths of any two of the sides, we must get at least the length of the other side."

Math: $\forall x_1, y_1, x_2, y_2, x_3, y_3 \in \mathbf{R} \left(d(x_1, y_1, x_2, y_2) + d(x_2, y_2, x_3, y_3) \geq d(x_1, y_1, x_3, y_3) \right)$ where

$$d(x, y, x', y') \stackrel{\text{def}}{=} \sqrt{(x - x')^2 + (y - y')^2} \ .$$

For the rest of this session, in your groups, try to rewrite each of these English statements to math, or math statements to English. Help each other, take notes on your answers, and the discussion leader will circulate between groups to see how you are doing, answer questions and give hints. **Please work quietly and support your classmates.** Normally, answering the discussion section questions will help you answer the corresponding discussion moodle quiz which will, starting next week, be posted Wednesday afternoon.

Together in your group, try to translate each one of the following statements into a reasonably equivalent statment. If given in Math, translate to English. If given in English, translate to Math. Also, if possible, try to figure out whether the statement is true or false.

1. Math: $(f : \mathbf{R} \to \mathbf{R}) \ \wedge \ \forall x, y \in \mathbf{R} \, (x < y \ \leftrightarrow \ f(x) < f(y))$

2. English: The identity function, id_S, on a given set, S, maps every element of the set to itself.

3. Math: $\forall q \in \mathbf{Q} \ q \in \mathbf{R} \ \wedge \ \exists r \in \mathbf{R} \ r \notin \mathbf{Q}$

4. English: Every positive real number has the property that its square is less than itself just if it's less than 1.

5. Math: $(f : A \to B) \ \to \ (\mathbf{onto}(f) \ \leftrightarrow \ \forall b \in B \, \exists a \in A \, (f(a) = b))$

6. English: The function f from domain A to co-domain B is **1:1** (one-to-one) iff no two distinct elements of its domain are mapped to the same element.