Math 31AH Fall 2017 Written Homework 2, due 10/13/2017 in HW box in the basement of AP&M by 4 pm

1 Reading

Read Sections 1.4-1.5 of the text.

2 Exercises to submit on Friday 10/13

2.1 Exercises from the text

Write out each answer as a careful proof, in full sentences.

Section 1.2: #19

Section 1.3: #1(parts (h),(i) only), 5, 6, 7, 9, 12

Section 1.4: #4

Notes. In 1.3 #7, the symbol $\Longleftrightarrow$ that appears is shorthand for "if and only if". Remember that to prove a statement of the form "P if and only if Q", where P and Q are some mathematical statements, you need to prove both that if P holds then Q holds, and if Q holds then P holds.

In 1.3 #5 and #9, note that the rigorous definition of $A \subset B$, where A and B are sets, is the following statment: If $x \in A$, then $x \in B$. This is usually what you do to prove that A is a subset of B: you assume that x is an element of A, and prove that it must also be an element of B. Also, recall that I will use the symbol $\subseteq$ in class,

which means the same as the symbol $\subset$ your textbook uses. There is no consensus in the math community about the best notation for one set being a subset of the other and you will see both notations being used in future textbooks and courses.

For problem 1.3 #12, note that we say that two sets A and B are equal, $A = B$, if they have exactly the same elements. As mentioned in the footnote to the text on page 21, usually the best way to prove that $A = B$ is to prove in two steps that $A \subset B$ and $B \subset A$. In other words, you assume that $x \in A$ and prove that $x \in B$; then you assume that $x \in B$ and prove that $x \in A$.

2.2 Additional exercises not to be handed in

These are some other good exercises from these sections if you want to think about more problems for your own practice. Do not hand these in.
Section 1.2: #11, 12, 13, 15.
Section 1.3: #1, 2, 3, 4, 8, 10.