Math 200 − Homework 8

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This assignment is due on **Friday, April 14, 2017** at 9:50 AM.

Reading: Sections 7.1, 7.2, 7.3. In section 7.1, ignore examples 7.1.9 and 7.1.10, as well as the section on Boolean functions. In section 7.2, ignore the section "Application: Hash Functions," and examples 7.2.6 − 7.2.10 and 7.2.14. Everything else in those three sections is **very** important and has lots of concepts that will probably haunt you forever (especially in Linear Algebra), so the sooner you internalize them, the better. Section 7.3 has important terminology which you should try to thoroughly understand. I will already start with section 7.4 on Wednesday, but you won't be responsible for it until Homework 9 (which is already posted). Remember that just because I did not go through those sections in detail, that does **NOT** mean that they're not important, so make sure to thoroughly study them. The reason I didn't cover them as thoroughly is because I want to get to section 7.4, which is a bit harder.

- **Section 5.9:** (This is not a typo) 25
- **Section 7.1:** 7, 14, 42, 43, 47
- **Section 7.2:** 12, 23, AP
- **Section 7.3:** 8, 24, 27

Additional Problem: A function $f : \mathbb{R} \to \mathbb{R}$ is called **strictly increasing** if, whenever $x > y$, then $f(x) > f(y)$. Show that if f is strictly increasing, then it is one-to-one.

Hint: If $x \neq y$, then either $x > y$ or $x < y$.

Hints to the other problems:

5.9.25 Calculate a the first few values of $G(n)$ and see what happens

7.1.14 Remember that a function is defined by what it does to every element of its domain A

7.1.42, 7.1.43, 7.1.47 Remember that to prove that $A = B$, it's enough to show $A \subseteq B$ and $B \subseteq A$. Also $x \in F^{-1}(A)$ means $F(x) \in A$ and $x \in F(A)$ means that $x = f(a)$ for some $a \in A$.

7.3.27 **Careful!** Although the statement is true, it is not as obvious as you think, since you're dealing with functions on sets. You should really show, using the definition on page 392, that each set is contained in the other. Also, there should be an extra $)$ on the right.