Math 200 − Homework 7

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Friday, April 7, 2017

This assignment is due on **Friday, April 7, 2017** at 9:50 AM.

Reading: All of Chapter 6. Ignore the optional section on pages $348 - 349$, as well as the paragraphs about artificial intelligence on page 359. You do not need to memorize the *names* of the set identities on page 355 go, **except** for commutativity, associativity, distributivity, and De Morgan. In section 6.3, you can ignore the proof of Theorem 6.3.1 *if* you understood the proof I gave in lecture (with $n = 3$). In section 6.4, ignore the part about Boolean algebras,; you're only responsible for Russel's paradox and the Halting Problem and whatever paradoxes are on the homework. You are not responsible for understanding the Axiom of Choice / Banach-Tarski paradox that I'll do in lecture on Wednesday.

- **Section 6.1:** 12, 26, 31
- **Section 6.2:** 10, 15, 31, 37 (see **Note**)
- **Section 6.3:** 15, 20, 42
- **Section 6.4:** 24, 26

Note: Please prove 6.2.37 in two ways: By showing that each is a subset of the other, and also prove it by induction on n, using the distributive law of sets.

Hint for 6.4.24: The contradiction lies in the fact that you just described n using a sentence containing 11 words, hence 12 words or less!

Hint for 6.4.26: Suppose $\mathcal{P}(A) \subseteq A$ and let $B = \{x \in A \mid x \notin x\}$. Is $B \in \mathcal{P}(A)$? Is $B \in A$? Then argue by cases, depending on whether $B \in B$ or $B \notin B$. Make sure to indicate where you used the fact that $B \in A$!