Instructions: Complete all problems from the list below. This assignment will be due on Gradescope no later than **7pm on Wednesday, October 5th**. Late work will not be accepted. There will be no exceptions for technology issues, so I suggest you upload your homework at least one hour before the deadline. Please make sure you've done all of the following before submitting your work:

* **Do not** write your name anywhere on your submission. Gradescope will keep track of your submission, and will allow me to use a blind grading process.
* Type your homework using LaTeX.
* Write up proofs formally and completely.
* If you use any resources (stackexchange, tutors, friends), please include a list of references in your writeup.

Chapter 3 Problems:

3. Prove Lemma 3.5 from the lecture notes. *(Hint: induct on n).*
6. Show that the set of integers with an odd number of decimal digits does not have a natural density.
7. Show that a composite integer n contains a divisor d with $d \leq \sqrt{n}$.
8. Prove that every Carmichael number must be odd.
9. Prove that a Carmichael number must be a product of distinct primes.
10. Prove that if n is a composite number, then $2^n - 1$ is not prime.