Midterm information

Midterm rules: 1. It's closed book, but you may bring one sheet of notes (both sides). No electronic devices of any kind. Bring your own paper!

2. Remember that solutions will be graded for quality as well as technical correctness.

3. If a particular method of proof is requested (induction, proof by contradiction, etc.), then you need to use that method. These methods are a major part of the course content.

Some topics that will **NOT** be on the exam:

- strong induction
- expansion in a base
- recursive definition

Practice problems for the midterm:

1. There will definitely be a proof by induction. Try the three problems (I added one more) under "Three more induction problems". Be sure to label clearly the base case, inductive step and inductive hypothesis.

2. Problem 4 from Chapter 2 on "triplet primes". There will be a similar but much easier problem of this type on the midterm, where you need to formulate and prove the problem as a biconditional. So review your biconditionals!
Suggestion: There are three possibilities for the remainder after dividing n by 3: 0, 1, or 2. Contemplation of these cases should lead to a guess for the answer, and to its proof.

3. Problem 8 from Chapter 2 on "prime gaps". This is an interesting fact in itself, and gives you some more practice with primes and divisors.

4. Suppose $n \in \mathbb{N}$, $n > 1$, and n has the property that whenever $n|ab$ then $n|a$ or $n|b$. Use proof by contradiction to show n is a prime.
Note: There will definitely be a proof by contradiction on the midterm. You can get some credit just for showing you know how to start such a proof. How do you start it here?

5. There will definitely be some problems like those in section 6.6 (which I just added). In other words, you need to determine an image or an inverse image, but with no proof required. Be sure to do Problems 1 and 2 of 6.6 for practice. Problem 3 is harder than anything that would be on the midterm, but why not give it a try anyway?

6. Another good way to practice is to prove some of the easier results in the notes, without looking at the proof given. Then you can check yourself against the proof given in the notes. Here's one I recommend for practice with irrational numbers: Cover up the proof of Theorem 4.15 and prove it yourself, using Theorem 4.10.

Finally, note that the topics above are only a partial list of what might show up on the midterm. Anything is fair game!