

Here is a list of general topics you should be familiar with for the first midterm.

CHAPTER 1

Section 1.1 - 1.3: Know how to determine the truth value of propositions formed with symbols like $P, Q, R, \wedge, \vee, \sim, \forall, \exists$

Section 1.4-1.7: Be able to write proofs. Use techniques like: direct proof, proof by contradiction, contrapositive, cases, proofs with quantifiers (\forall or \exists).

CHAPTER 2

Section 2.1: Know basic definitions related to sets. Know \mathcal{P} (powersets), \emptyset , and the difference between \in and \subset .

Section 2.2: Know $\cap, \cup, -, A^c$ (complement), and \times (Cartesian product)

Section 2.3: Be able to prove things about families of sets.

Section 2.4: Be comfortable with induction and be able to use it in a proof. (Don't worry about Peano's axioms) Know the symbols \sum, \prod , and $!$ (factorial).

Section 2.5: Know WOP (Well-Ordering Principle) and PCI (Principle of complete induction) and how to use them. Know the statement of the division algorithm (but you won't have to reproduce the proof).

Section 1.8: Know what $\gcd(a, b)$ means, know what a linear combination is, and know their relationship. Also, know Euclid's Lemma, which states that if $a, b, p \in \mathbb{Z}$ with p prime, then $p|ab$ implies $p|a$ or $p|b$.

OTHER

You should know the proof that $\sqrt{2}$ is irrational. Don't just memorize it, understand it. It is proven in Section 1.5 and we discussed it several times in class.

You also need to have good proof writing technique: define all variables you use, explain every step clearly, use English sentences (not just equations), prove things in the "correct direction" (don't prove a claim by assuming the claim and concluding something true), and make sure your proofs are always organized.