

The second midterm will be held on Monday April 8, 2012 and will emphasize material from Section 3.3, Chapters 4 and 5, and Section 6.1. However, there will be some material from earlier chapters. For example you need to know how to write down converses and contrapositives. You'll need to know how to prove results by contradiction or using the contrapositive, or by induction. We've also seen a new proof technique: strong induction.

The exam will be closed book. I will provide for you a list of any relevant propositions from the text and the homework, except:

- I will **not** provide for you the statement of any Axiom.
- I will **not** provide for you the statement of any Theorem.
- I will **not** provide for you the statements of any Proposition that is very closely related to a Theorem or an Axiom.
- I will **not** provide for you the statements of any Proposition that is not fundamental or is irrelevant to the exam.

Reasonable tasks for the exam include (but are not limited to):

- Prove a brand new result that is not in the text but can be proved from our propositions.
- Prove a result from the text.
- State major definitions, theorems, and axioms.
- State the "first line of the proof."
- Given the statement of a proposition, set up the proof using the contrapositive or converse or weak or strong induction (without actually finishing the proof).
- Given a flawed proof, find the error and fix it.

Mathematicians live and die by definitions. You have to know them. Here are some definitions you need to know (regardless of whether they show up on the midterm or not)

- The intersection or union of two sets. The complement of one set contained in another.
- Set differences.
- The Cartesian product of two sets.
- The recursive definitions of sums, products, factorials, and powers. Also Fibonacci numbers.
- Relations, equivalence relations, equivalence classes.

Among other things, here are some basic tasks you should be prepared to do:

- Prove things about recursively defined sequences using induction.
- Prove something using strong induction.
- Show that set A is a subset of set B by picking an arbitrary element of A and showing it belongs to B .
- Show that a set A equal to a set B by proving that $A \subseteq B$ and vice-versa.
- Show that a given relation is an equivalence relation.
- Negate an “if-then” statement, or negate a long compound statement (e.g. 3.7 (vii))
- Show that a proposition isn’t true by providing a counterexample.