

## Math 446 — Exam 2 — Review Topics

### Chapter 7. Well Ordered Sets.

w.o. sets, successor points, limit points, finite points, initial segments  
similarities,  $=_o$   
expansive maps on p.o.sets  
(proof by) transfinite induction  
(definition by) transfinite recursion  
the iteration lemma  
initial similarities,  $\leq_o$ , comparability, well-foundedness  
 $\chi(A)$ , Hartogs' Theorem  
Fixed Point Theorem (7.35)

You are *not* responsible for the Least Fixed Point Theorem and the proof of Hartogs' Theorem.

Exercises x7.5, 7.11, 7.12, 7.25

### Chapter 8. Choices.

the Axiom of Choice and its equivalence with the existence of choice sets and choice functions  
the equivalence of AC with Cardinal Comparability and the Well Ordering Theorem  
the equivalence of AC with existence of maximal chains and Zorn's Lemma  
 $AC_{\mathbb{N}}$ , DC, the implications between them and AC  
DC implies that the well-founded p.o. sets are precisely those with no infinite descending chains

You are *not* responsible for graphs or DC for strings (8.14).

Exercises x8.1, 8.4

### Chapter 9. Choice's Consequences.

$\mathbb{N}$  embeds into every infinite set  
finite is equivalent to Dedekind-finite  
(AC) the well-foundedness of  $\leq_c$   
(AC) existence of the next cardinal  
"best" well orderings  
(AC) absorption laws for  $+_c$  and  $\cdot_c$

You are *not* responsible for trees and the results about them (König's Lemma, the Fan Thm.) or anything after 9.16.

Exercises x9.7, 9.26