## MATH 502 HOMEWORK 3

Due Friday, October 18.

**Problem 1.** Let  $\mathcal{L} = \{s\}$ , where s is a unary function symbol. Let T be the  $\mathcal{L}$ - theory that asserts that s is a bijection with no cycles (i.e.,  $s(n)(x) \neq x$  for n = 1, 2, ...). For which cardinals  $\kappa$  is T  $\kappa$ -categorical? Is T complete?

Problem 2. Exercise 5.28 from the lecture notes.

Problem 3. Exercise 5.37 from the lecture notes.

**Problem 4.** Let U be a non-principal ultrafilter on the set of prime numbers. For each prime p, let  $F_p^{alg}$  be the algebraic closure of  $F_p$ , the filed with p elements. Prove that  $\prod F_p^{alg}/U$  is an algebraically closed field of characteristic 0.

**Problem 5.** Exercise 5.39 from the lecture notes.