Name: Collaborators: Outside resources:

> Math 2106, Foundations of Mathematical Proof HW 5 — Due Oct 28, 2016 (Fri)

From the textbook: Chapter 9, problems 12, 26, 34, 42 Chapter 10, problems 6, 12, 16, 18, 20, 22, 24

## Additional problems

- A1 Let A be a set. Describe each of the following sets:  $A^{\emptyset}, \emptyset^{\emptyset}$ , and  $\emptyset^{\{A\}}$ . Recall that  $Y^X$  denotes the set of all functions from X to Y.
- A2 Let f be a function from A and B. Let  $C \subseteq A$  and  $D \subseteq B$ . Prove the following statements.
  - (a)  $f^{-1}(f(C)) \supseteq C$ .
  - (b)  $f(f^{-1}(D)) \subseteq D$ .
  - (c) f is one-to-one if and only if  $f^{-1}(f(C)) = C$  for all  $C \subseteq A$ .
  - (d) f is onto if and only if  $f(f^{-1}(D)) = D$  for all  $D \subseteq B$ .

For extra practice, the following problems are recommended.: Chapter 9, problems 1,4,9,11,13,16,19,23,25,29,31,33,37,39,43,53. Chapter 10, problems 1,3,5,11,25.