Math 112, Mr. Church, Homework 1 (modified 10/5)
Due at the beginning of class on Wednesday, October 7.
Please staple your homework.

1. Exercise 1.3.

2. Exercise 1.6. (This is rather hard, but do your best. Remember that this is looking for a proof, not just an example or two.)

3. Exercise 1.7. (In this question $A = \{1, 2, 3\}$ and $B = \{1, 2, 3, 4, 5\}$.

4. **Added:** Exercise 1.9.

5. Exercise 1.11. (The composition of two functions f and g is the function $f \circ g$ defined by $f \circ g(x) = f(g(x))$. Do your best on this problem and discuss it in tutorial.

6. Start with a natural number $n \in \mathbb{N}$, and define the function $f \colon \mathbb{R} \to \mathbb{R}$ by $f(x) = x^n$. For which numbers n will f be one-to-one? For which n will f be onto? Justify your answer (as well as you can).

   (Hint: try $n = 1$, so that $f(x) = x$. Is this function one-to-one? Is it onto? Now try $n = 2$, so that $f(x) = x^2$. Is this one-to-one? onto? Try $n = 3$, so that $f(x) = x^3$. Use this evidence to try to see the pattern.)

7. Start with a real number $c \in \mathbb{R}$, and define the function $f \colon \mathbb{R} \to \mathbb{R}$ by $f(x) = cx$. For which real numbers c will f be one-to-one? For which c will f be onto? Justify your answer.

Moved to HW2:
Exercise 1.10.
Exercise 1.12.
Exercise 1.13.