MCS 220: Week 6 Quiz Name: _____
Tuesday, 14 March 2017 (Happy Pi Day)

1. According the definition in our textbook, a function $f : A \to B$ is called *injective* iff, □

   _____

2. According to this definition, a function $f : A \to B$ is *not injective* iff, □

   there exist _____

3. Suppose $A = \{1, 2, 3\}$ and $B = \{10, 20, 30, 40\}$. Let $f : A \to B$ be defined by □

   $$f(1) = 10, f(2) = 20, \text{ and } f(3) = 30.$$

   Now consider a subset $C = \{1, 2\}$ of A. According to the definition of image,

   $$f\big(\ \{1, 2\}\ \big) = \{\_\_\_\_\_\}$$

   According to the definition of preimage,

   $$f^{-1}\big(\ \{20, 30, 40\}\ \big) = \{\_\_\_\_\_\}$$

   Is f injective? (You don't need to write a formal proof)

   Is f surjective? (You don't need to write a formal proof)

4. Define a function $f : A \to B$ which is *not* injective. Clearly state what A and B are, and how f is defined. Prove that the function f you define is indeed *not* injective. □

5. (OPTIONAL) Sec 2.3 Ex 11 page 79 (a): □

Prove that, if $f \circ f$ is injective, then f is injective.

6. (OPTIONAL) Sec 2.3 Ex 21 page 81 (c): □

Prove that, if f is injective, then $f(A \backslash C) = f(A) \setminus f(C)$.