Mathematics 216
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Homework 19
Due March 16, 2012

1. Suppose that $f : X \to Y$ is a function, and $A \subset X$. Prove or give a counterexample:

$$Y \setminus f(A) \subset f(X \setminus A).$$

As usual, a counterexample means giving explicit sets X, Y, and A, and an explicit function $f : X \to Y$.

2. Suppose that $f : X \to Y$ is a function, and $B \subset Y$.
   (*a*) Show that $f(f^{-1}(B)) \subset B$.
   (*b*) Give an explicit example in which $f(f^{-1}(B)) \neq B$.
   (*c*) Suppose that f is a surjective function. Show that $f(f^{-1}(B)) = B$.