Math 4710/5710-101 # Homework #1 **Due: Mon., Aug. 25^{th}, 2014**

Munkres' Topology §2 Problem #2 (pages 20-21): Let $f : A \to B$ and let $A_i \subset A$ and $B_i \subset B$ for $i = 0$ and $i = 1$. Show that f^{-1} preserves inclusions, unions, intersections, and differences of sets:

(a) $B_0 \subset B \implies f^{-1}(B_0) \subset f^{-1}(B)$.

(b) $f^{-1}(B_0 \cup B_1) = f^{-1}(B_0) \cup f^{-1}(B_1)$.

(c) $f^{-1}(B_0 \cap B_1) = f^{-1}(B_0) \cap f^{-1}(B_1)$.

(d) $f^{-1}(B_0 - B_1) = f^{-1}(B_0) - f^{-1}(B_1)$.

Show that f preserves inclusions and unions only:

(e) $A_0 \subset A_1 \implies f(A_0) \subset f(A_1)$.

(f) $f(A_0 \cup A_1) = f(A_0) \cup f(A_1)$.

(g) $f(A_0 \cap A_1) \subset f(A_0) \cap f(A_1)$; show equality holds if f is injective.

(h) $f(A_0 - A_1) \supset f(A_0) - f(A_1)$; show equality holds if f is injective.