

Name: _____

PanthID: _____

Take home part of Final Exam MAA 3200

Due Tuesday, Dec.8

1. (24 pts) Let $f : X \rightarrow Y$ be a function.

(a) (8 pts) Prove that for any subsets B_1, B_2 of Y

$$f^{-1}(B_1 \cap B_2) = f^{-1}(B_1) \cap f^{-1}(B_2).$$

(b) (8 pts) Prove that for any subsets A_1, A_2 of X

$$f(A_1 \cap A_2) \subseteq f(A_1) \cap f(A_2).$$

(c) (8 pts) Give a concrete example to show that inclusion in part (b) is not, in general, an equality.

2. (21 pts) Suppose that X is an infinite set (possibly non-countable) and A is a countable subset of X . Show that if $X - A$ is infinite, then X and $X - A$ have the same cardinality.