Mathematics 433 Fall 2010 Problems to Turn in: 1

September 24

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Name

Directions: Be sure to include in-line citations, including page numbers if appropriate, every time you use the results of discussion, a text, notes, or technology.

Only write on one side of each page.

"The one real object of education is to have a man in the condition of continually asking questions." -Bishop Mandell Creighton

Problems

1. Do **all** of the following.

   (a) #11, 14, 21, 22b, 22d of Judson Chapter 1 (Pages 16,17)

2. Let $f : X \longrightarrow Y$ be a map of sets with $A_1, A_2 \subset X$ and $B_1, B_2 \subset Y$.

   Do **all** of the following

   (a) Prove $f(A_1 \cap A_2) \subset f(A_1) \cap f(A_2)$ and give an example where equality fails.

   (b) Prove $f^{-1}(B_1 \cup B_2) = f^{-1}(B_1) \cup f^{-1}(B_2)$

   (c) Prove $f^{-1}(Y \setminus B_1) = X \setminus f^{-1}(B_1)$

   (d) Look at problem 24 of Chapter 1 of Judson and note that, in general, inverse images behave 'nicely' with respect to intersections but not so nicely under unions.

3. Let $f : A \longrightarrow B$ be a surjective map of sets.

   (a) Prove that the relation defined by $a \sim b$ if and only if $f(a) = f(b)$ is an equivalence relation.

   (b) Prove that the equivalence classes of this relation are the fibers of f.