

Ma551 Homework 1

Suppose that $f : X \rightarrow Y$ is a function, that $A, C \subseteq X$ and $B \subseteq Y$.

1. Show that $A \subseteq f^{-1}(f(A))$. Give an example to show that the inclusion may be proper. Under what conditions on f will they be equal (justify your assertion)?
2. Show that $f(f^{-1}(B)) \subseteq B$. Again give an example to show that the inclusion may be proper. Under what assumptions will they be equal (justify your assertion)?
3. What is the relation of $f(A) \cup f(B)$ to $f(A \cup B)$? What condition on f will make them equal?
4. What is the relation of $f(A) \cap f(B)$ to $f(A \cap B)$? What condition on f will make them equal?