

## MATH 220 HANDOUT 10 - PREIMAGES

Let  $f: A \rightarrow B$  be a function, let  $W \subseteq A$ , and let  $X, Y \subseteq B$ . Prove or disprove each of the following:

- (1)  $f^{-1}(X \cup Y) \subseteq f^{-1}(X) \cup f^{-1}(Y)$ .
- (2)  $f^{-1}(X \cup Y) \subseteq f^{-1}(X) \cup f^{-1}(Y)$ .
- (3)  $f^{-1}(X \cap Y) \subseteq f^{-1}(X) \cap f^{-1}(Y)$ .
- (4)  $f^{-1}(X \cap Y) \subseteq f^{-1}(X) \cap f^{-1}(Y)$ .
- (5)  $W \subseteq f^{-1}(f(W))$ .
- (6)  $W \subseteq f^{-1}(f(W))$ .
- (7) (HW)  $X \subseteq f(f^{-1}(X))$ .
- (8) (HW)  $X \subseteq f(f^{-1}(X))$ .