

## MATH 250 HANDOUT 10 - PREIMAGES

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

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