

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