

Warm-up questions

(These warm-up questions are optional, and won't be graded.)

1. Consider \mathbb{R} with the Euclidean metric. Which of the following maps $f : \mathbb{R} \rightarrow \mathbb{R}$ are homeomorphisms?

(a) $f(x) = ax + b$ (b) $f(x) = x^2$ (c) $f(x) = x^3$ (d) $f(x) = \sin(x)$

2. Let $f : X \rightarrow Y$ be an **invertible** function of sets, and let $S \subseteq Y$. The notation $f^{-1}(S)$ could denote either the preimage of S under f , or the image of S under the inverse function f^{-1} . Show that these two sets are equal, so there is no ambiguity in using the notation $f^{-1}(S)$.

3. Let $f : X \rightarrow Y$ be an **invertible** function of sets.

- (a) Show that, for subsets $B \subseteq Y$, there is equality $f(f^{-1}(B)) = B$.
- (b) Show that, for subsets $A \subseteq X$, there is equality $f^{-1}(f(A)) = A$.

Worksheet problems

(Hand these questions in!)

- Worksheet #7 Problems 1, 2.

Assignment questions

No questions this week. Happy Fall Break!