

Exercises

3.143 [091] Let D, C be non-empty sets and $f : D \rightarrow C$ a function. Let I a non-empty family of indexes, $B_i \subseteq C$ for $i \in I$. Given $B \subseteq C$ remember that the **counterimage** of B is

$$f^{-1}(B) \stackrel{\text{def}}{=} \{x \in D, f(x) \in B\} ,$$

Given $B \subseteq C$ we write $B^c = \{x \in C, x \notin B\}$ to denote the complement. Show these counterimage properties.

$$f^{-1}\left(\bigcup_{i \in I} B_i\right) = \bigcup_{i \in I} f^{-1}(B_i) \quad (3.143)$$

$$f^{-1}\left(\bigcap_{i \in I} B_i\right) = \bigcap_{i \in I} f^{-1}(B_i) \quad (3.144)$$

$$f^{-1}(B^c) = f^{-1}(B)^c . \quad (3.145)$$