If A and B are subsets of $\mathcal{X}$, and $A_1, A_2, \ldots$ is a sequence of subsets from $\mathcal{X}$, then the inverse image satisfies these properties.

1. If $A \subset B$, then $X^{-1}(A) \subset X^{-1}(B)$.
2. $X^{-1}(A \cup B) = X^{-1}(A) \cup X^{-1}(B)$.
3. $X^{-1}(A \cap B) = X^{-1}(A) \cap X^{-1}(B)$.
4. $X^{-1}\left(\bigcup_{i=1}^{\infty} A_i\right) = \bigcup_{i=1}^{\infty} X^{-1}(A_i)$.
5. $X^{-1}\left(\bigcap_{i=1}^{\infty} A_i\right) = \bigcap_{i=1}^{\infty} X^{-1}(A_i)$.
6. If $h(\omega) = g[X(\omega)]$, then $h^{-1}(A) = X^{-1}[g^{-1}(A)]$.
7. $X^{-1}(\sim A) = \sim X^{-1}(A)$.