Exercise 2: Functions.

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1. Show that $f(A \cap B) \subset f(A) \cap f(B)$. Give an example where $f(A \cap B) \neq f(A) \cap f(B)$.

2. Let $f(x) = x^2$ and $B = \{y | y \geq 1\}$. Compute $f^{-1}(B)$.

3. Let

$$\begin{aligned} f(x) &= 1 && \text{for } x > 0 \\ &= 0 && \text{for } x = 0 \\ &= -1 && \text{for } x < 0 \end{aligned}$$

Let $S = T = \mathbb{R}$ and $A = B = \{x | -2 < x < 1\}$. Compute $f(A)$ and $f^{-1}(B)$. Is the function onto? Is the function one–to–one?