Warm-up #10

Let \( f : X \to Y \) be a function. Show that \( f \) is continuous at \( p \in X \) if and only if for each \( \epsilon > 0 \) there is a \( \delta > 0 \) such that \( f(B_\delta(p)) \subset B_\epsilon(f(p)) \), where

\[
f(B_\delta(p)) = \{ f(x) : x \in B_\delta(p) \}.
\]