Name: _____ Score (Out of 7 points):

1. (7 points) Prove the following theorem, which gives a new equivalent definition of continuity.

   Theorem. Let (X, d_X) and (Y, d_Y) be metric spaces, and let $f : X \to Y$ be a function. Then f is continuous if and only if it satisfies the following property: for every closed set $C \subseteq Y$, the preimage $f^{-1}(C)$ is closed in X.