Name: ______________________________ Score (Out of 8 points):

1. (2 points) Let (X, d_X) and (Y, d_Y) be metric spaces. State what it means for a function $f : X \to Y$ to be continuous. You may use any of our equivalent definitions.

2. (3 points) Let (X, d_X) and (Y, d_Y) be metric spaces, and let $y_0 \in Y$. Show that the constant function

$$\begin{aligned} f : X &\longrightarrow Y \\ f(x) &= y_0 \qquad \text{for all } x \end{aligned}$$

is always continuous.

3. (3 points) Let (X, d_X) and (Y, d_Y) be metric spaces. Let S be a subset of X. Recall that S inherits a metric space structure under restriction of the metric on X.

   Let $f : X \to Y$ be a function. Recall that the *restriction* of f to S, often written $f|_S$, is the function

$$\begin{gathered} f|_S : S \longrightarrow Y \\ f|_S(s) = f(s). \end{gathered}$$

   Prove that, if f is a continuous function, then its restriction $f|_S$ to S is also a continuous function.