Name: _____

Problem Set #1 - due Wed. Aug 24

- **1.** We say that a set $U \subset \mathbb{R}$ is *open* if it is a union of open intervals. Show that U is open if and only if
 - For every point $u \in U$ there exists $\delta > 0$ such that $(u \delta, u + \delta) \subset U$.

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- **2.** We say that $f : \mathbb{R} \to \mathbb{R}$ is *continuous* if $f^{-1}(U)$ is open for every open set U. Show that f is continuous if and only if
 - For every $x_0 \in \mathbb{R}$ and every $\epsilon > 0$ there exists $\delta > 0$ such that

$$|x-x_0| < \delta \implies |f(x)-f(x_0)| < \epsilon.$$