# Homework #1

$\boxed{1}$ Suppose that $f : X \to Y$ is uniformly continuous and that $(a_n)$ is a Cauchy sequence from $X$. Prove that the sequence $(f(a_n))$ is Cauchy in $Y$.

$\boxed{2}$ Prove the **Intermediate Value Theorem**: If the function $f : [a,b] \to \mathbb{R}$ is continuous, then it takes on every value between $f(a)$ and $f(b)$ at some point within the interval $[a,b]$. (In other words, for every value $y$ between $f(a)$ and $f(b)$, there is some point $x \in [a,b]$ such that $f(x) = y$.)