1. Let $n$ be a positive integer and define $f(x) = \int_0^x \dfrac{1}{t^{2n}+1}\,dt$. Using the definition of continuity, prove that $f(x)$ is continuous at any real number $p$. [Hint: $\dfrac{1}{t^{2n}+1} \leq 1$.]

2. a) State Bolzano's Theorem.

   b) State the Intermediate Value Theorem.

3. Prove that the function $f(x) = 1 + \sin(x)$ has a fixed point, (i.e., there is a number $c$ such that $f(c) = c$).