1. (10 pts) Use the definition to prove that the derivative of \( f(x) = x^4 \) at \( x = c \) is \( 4c^3 \).

(hint: we can factor \( x^4 - c^4 \) as \((x^2 - c^2)(x^2 + c^2)\) and then factor \( x^2 - c^2 \).)
2. (10 pts) Prove that $f(x) = \frac{1}{x}$ is uniformly continuous on $[1, \infty)$ but not uniformly continuous on $(0, \infty)$. 