Homework 5

1. Using the definition only, find the derivative of $f : \mathbb{R} \to \mathbb{R}$, $f(x) = x^3 + 3x^2 + 2$.

2. Using the definition only, find the derivative of

   $$f : (0, \infty) \to \mathbb{R}, \quad f(x) = \frac{1}{x^3}.$$ 

3. Using the definition only, find the derivative of $f(x) = \sqrt[3]{x}$.

4. Find the derivative of $f : (0, \infty) \to \mathbb{R}$, $f(x) = x^2$. (Hint: You can use any tools you know.)

5. Show that $f(x) = x^{1/3}$, $x \in \mathbb{R}$ is not differentiable at 0.