

Problem 1. Let $f(x) = x^3 - 18x + 31$. Use the Intermediate Value Theorem to show that there exists $c \in \mathbb{R}$ such that $f(c) = \pi$.

Problem 2. Let $f(x) = \frac{1}{x}$. Directly apply the definition of derivative to find $f'(x)$.

Problem 3 (Extra Credit). Find a function $f(x)$ such that $f'(x) = \frac{x}{|x|}$.