(1) Using a Theorem, prove that $f(x) = x^3$ is increasing on $\mathbb{R}$.

(2) Using the definition and not theorems, prove that $f(x) = x^3$ is strictly increasing on $\mathbb{R}$.

(3) Prove or disprove: Let f be differentiable on $\mathbb{R}$. If f is strictly increasing on $\mathbb{R}$, then $f'(x) > 0$ for all $x \in \mathbb{R}$.

(4) Prove or disprove: Let f be differentiable on $\mathbb{R}$. If $f'(x) > 0$ for all $x \in \mathbb{R}$, then f is strictly increasing on $\mathbb{R}$.

(5) Prove or disprove: If $f'(r) = 0$, then there is some $a, b \in \mathbb{R}$ with $a < r < b$ such that f attains its maximum value or minimum value on $[a, b]$ at $x = r$.

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