Homework 2

A portion of the following problems will be graded according to the provided rubric.

1. Rudin page 114 problem 7
2. Rudin page 114 problem 8
3. Rudin page 115 problem 9
4. Rudin page 115 problem 11
5. Rudin page 115 problem 12
6. Let $a \in \mathbb{R}$ and $f: (a, \infty) \to \mathbb{R}$ be twice differentiable.
    a. Use Taylor's Theorem to show that $f'(x) = \frac{1}{2h}[f(x+2h) - f(x)] - hf''(\xi)$ for some $\xi \in (x, x+2h)$.
    b. Use the result from part a to show that if M_0, M_1, and M_2 are the least upper bounds of $|f(x)|, |f'(x)|, \text{and } |f''(x)|$ respectively on (a, ∞), then $|f'(x)| \leq hM_2 + \frac{M_0}{h}$.
    c. Use part b to show $M_1^2 \leq 4M_0M_2$.
7. Rudin page 116 problem 16
8. Rudin page 118 problem 25