HOMEWORK 8

Exercise 1. Solve exercises 28.4, 28.8, 28.10, and 28.15 from the textbook.

Exercise 2. Solve exercises 29.3, 29.5, 29.12, and 29.18 from the textbook.

Exercise 3. Let $f : [a, b] \to \mathbb{R}$ be a continuous function on the closed interval $[a, b]$ and differentiable on the open interval (a, b). Show that for any $c \in (a, b)$ that is not a point of maximum or minimum for f' there exist $x_1, x_2 \in (a, b)$ such that

$$f'(c) = \frac{f(x_2) - f(x_1)}{x_2 - x_1}.$$

Exercise 4. Let $f : [a, b] \to \mathbb{R}$ be a continuous function on the closed interval $[a, b]$ and differentiable on the open interval (a, b). Assume that f' is strictly increasing. Show that for any $c \in (a, b)$ such that $f'(c) = 0$ there exist $x_1, x_2 \in [a, b]$, $x_1 < c < x_2$ such that

$$f'(c) = \frac{f(x_2) - f(x_1)}{x_2 - x_1}.$$

Exercise 5. Let $f : (a, b) \to \mathbb{R}$ be differentiable and let $c \in (a, b)$. Suppose that $\lim_{x\to c} f'(x)$ exists and is finite. Show this limit must be $f'(c)$.