

Homework 5

1. Determine whether the Mean Value Theorem can be applied to f on the closed interval $[a, b]$. If the Mean Value Theorem can be applied, find all values of c in the open interval (a, b) such that

$$f'(c) = \frac{f(b) - f(a)}{b - a}$$

(a) $f(x) = \frac{1}{2}x^4 - \frac{5}{2}x^2 + 2x$, $[1, 2]$

(b) $f(x) = x^2 - 8x + 5$, $[2, 6]$

2. $f(x) = x^3 + 3x^2 + 5$

- (1) Find the open intervals on which the function is increasing or decreasing.
- (2) Find any points of inflection and discuss the concavity of the graph of the function.
- (3) Find all relative extrema of the function.

3. Find $\lim_{x \rightarrow \infty} h(x)$, if it exists, $f(x) = -4x^2 + 2x - 5$

(a) $h(x) = \frac{f(x)}{x}$

(b) $h(x) = \frac{f(x)}{x^2}$

(c) $h(x) = \frac{f(x)}{x^3}$