

Section 11.5 Higher Order Derivatives

- Finding the first, second, third, (... etc.) derivative of a given function
- Applying multiple differentiation methods to a single function.
- Understanding the meaning of the first and second derivative of a function (for example, given a displacement function $f(x)$, $f'(x)$ is velocity, and $f''(x)$ is acceleration.)

Section 12.1 Applications of the First Derivative

- Understanding that the first derivative gives the rate of change of a function at a given point.
- Using the first derivative to find the intervals where a given function is increasing and the intervals where it is decreasing.
- Know definition of a critical point, and how to find the critical points of a given function.
- Given the graph of a function, be able to identify where the first derivative of a function is positive, where it is negative, where it is zero, and where it is undefined from the graph.
- Using the first derivative to find and classify the relative extrema of a given function.

Section 12.2 Applications of the Second Derivative

- Understanding that the second derivative gives the rate of change of the rate of change of a function at a given point, that is, its concavity.
- Using the second derivative to find the intervals where a given function is concave up and the intervals where it is concave down.
- Know definition of an inflection point, and how to find the inflection points of a given function.
- Given the graph of a function, be able to identify where the second derivative of a function is positive, where it is negative, where it is zero, and where it is undefined from the graph.
- Using the second derivative to classify the relative extrema of a given function.

Section 12.3 Curve Sketching

- Finding and graphing the x and y intercepts of a function.
- Analyzing the first and second derivatives of a function to determine its increasing/decreasing behavior and its concavity on different intervals.
- Finding and graphing the relative extrema and inflection points of a function.
- Given a description of a function via information about its first derivative, second derivative, relative extrema, and intercepts, be able to sketch a graph that matches the description.
- Given a function, combine all the curve sketching methods discussed above in order to sketch an accurate graph of the function.

Section 12.4 Optimization I

- Know the definition of absolute extrema.
- Be able to find the absolute extrema of a given function on a specified interval.
- Basic application problems involving finding absolute extrema.

Chapter 12 Review Problems: p. 808-809 # (1, 3, 11, 13, 14, 23, 26, 33, 37)