Math 229

Exam 2 Review Sheet

Section 13.1 and 13.2 Applications of the First Derivative

• Understand that the first derivative gives the rate of change of a function at a given point.
• Be able to use the first derivative to find the intervals where a given function is increasing and/or decreasing.
• Know definition of a critical number, and how to find the critical points of a 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.
• Be able to use the first derivative test to find and classify the relative extrema of a function.
• Be able to use the first derivative to find relative extrema in application problems.

Section 13.3 Higher Order Derivatives, Concavity, and the Second Derivative Test

• Know how to Find the first, second, and higher derivatives of a given function.
• Understand that the second derivative of a function gives the rate of change of the rate of change of a function at a given point, that is, its concavity.
• Be able to analyze the second derivative in order to find the intervals where a given function is concave up and/or concave down.
• Know definition of an inflection point, and how to find the inflection points of a 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.
• Understand the second derivative test and be able to use it to classify the relative extrema of a function.

Section 13.4 Curve Sketching

• Know how to find and graph the x and y intercepts of a function. Also know how to find vertical and horizontal asymptotes.
• Be able to analyze the first and second derivatives of a function in order to determine the increasing/decreasing behavior and the concavity of the function on different intervals.
• Know how to find and graph 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, be able to combine all the curve sketching methods discussed above in order to sketch an accurate graph of the function.

Section 14.1 Absolute Extrema

• Know the definition of absolute extrema and the statement of the Extreme Value Theorem.
• Be able to find the absolute extrema of a function on a specified interval $[a, b]$.
• Be able to solve basic application problems involving finding absolute extrema.

Section 14.2 Applications of Extrema

• Know and be able to apply the process for solving real word application problems using optimization.
• Familiarize yourself with common type of optimization problems such as maximizing area or volume, maximizing profit or revenue, or minimizing costs.