MTH 125 Test 3-Part I

You must show all steps in a neat and orderly manner. No calculators on this part of the test.

Evaluate the limits analytically. Do not use derivatives on any of these problems.
Section 2.3, page 87, problems 51-60

Find the derivatives.
You need to know all of the rules for finding derivatives in sections 3.2-3.6.

Find the absolute extrema of the function on the closed interval.
Section 4.1, page 207, 21-44

Determine whether Rolle’s Theorem can be applied to \( f \) on the closed interval \([a, b]\). If Rolle’s Theorem can be applied, find all values of \( c \) in the open interval \((a, b)\) such that \( f’(c) = 0 \). If Rolle’s Theorem cannot be applied, explain why not.
Section 4.2, page 214, problems 9-22

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

\[
 f''(c) = \frac{f(b) - f(a)}{b - a}.
 \]

If the Mean Value Theorem cannot be applied, explain why not.
Section 4.2, page 215, problems 39-52

For each of the given functions, use the First Derivative Test to identify all relative extreme points.
Section 4.3, page 223, problems 21-60

a) find the critical numbers of \( f’ \) (if any)

b) using a sign line for \( f’(x) \), find the open interval/s on which the function is increasing or decreasing

\[ f’(x) \]

\[ f’(x) \]

c) apply the First Derivative Test to identify all relative extreme points

For each of the given functions, find the points of inflection and discuss the concavity of the graph of the function.
Section 4.4, page 232, problems 13-32

Find the limit.
Section 4.5, page 242, problems 15-34
Analyze and sketch a graph of the function. Label any intercepts, relative extrema, points of inflection, and asymptotes.
Section 4.6, page 253, problems 1-10

Solve the optimization problems.
Section 4.7, page 262, problems 1, 2, 7, 17, 18, 19, and any problems in the notes.