MATH 241, Spring 2023, Nathan Reading Review: Test 1

This is an overview of the most important skills and understanding I expect you to have developed. I don't promise that every exam problem will match with something on this sheet.

Exam questions might test your understanding of some of the following important terms and concepts:

limit continuity differentiation integration Riemann sum

The exam might reasonably test your ability to carry out some of the following procedures.

- Compute the derivative of a given function, possibly using linearity, product rule, quotient rule, and/or chain rule.
- Given a function, determine its local maxima and minima and/or its global (AKA absolute) maxima and minima on a given interval.
- Find where a given function is increasing/decreasing and where the function is concave up/down.
- Compute the indefinite integral of a given function, possibly using linearity, substitution, and/or integration by parts.
- Compute a definite integral using the Fundamental Theorem of Calculus. (Don't panic because I said "Fundamental Theorem of Calculus." If you know how to compute definite integrals already, then when I say "using the Fundamental Theorem of Calculus", I mean "in the usual way that you already know".)
- Compute the arc length of a curve. The curve may be presented to you as a parametrized curve, or as the graph of a function y = f(x), or as the graph of a function x = f(y). You might be asked to give the answer in terms of an integral, without evaluating the integral.
- Compute the average value of a given function on a given interval. You might be asked to give the answer in terms of an integral, without evaluating the integral.
- Compute the amount of work done by a varying force or in a situation where different "pieces" of mass are given different displacements.
- Compute the force due to fluid pressure on a specified area.

The test will emphasize the new topics slightly more heavily than the review topics.

Remember that the test is not about memorizing physics facts. Physics facts that you need will be provided. (Refer to your lecture notes for exactly what will be provided.)

I will ask one or more challenge questions at the end of the exam, worth very few points of extra credit, and these problems are exempt from anything I have told you or will tell you about what I will or will not ask on the test.

Closed book, closed notes, no calculators.