Study Guide Exam 2

This exam will test you on the definitions of the terms as well as with computations. There will be no calculators on the exam. The essential concepts are exponential/logrithmic functions and the derivative.

§2.1 Exponential Functions
- General properties of exponential functions b^x (domain is $(-\infty, \infty)$, range is $(0, \infty)$, etc.)
- Know how to graph exponential functions
- Know Exponent rules (e.g. $b^m b^n = b^{m+n}$)
- Understand how to set up and solve the exponential growth/decay word problems

§2.2 Compound Interest and the Number e
- Know definition of e
- Know how to represent e^r as a limit
- Know compound interest formula $A(t) = Pe^{rt}$ and how to use it with word problems

§2.3 and §2.4 Logarithmic Functions and Natural Logarithm and Applications
- What is an inverse function?
- Know definition of $\log_b x$ for any b. The logarithm is the inverse function of exponentiation (i.e. $b^{\log_b x} = x$ and $\log_b b^x = x$)
- Know how to graph logarithmic functions
- Manipulate and solve equations with logarithms
- Know logarithm rules (e.g. $\log_b a^n = n \log_b a$)
- Know what the natural logarithm is ($\ln x = \log_e x$)
- Be able to represent b^x as a power of e
- Be able to represent $\log_b x$ using natural logarithms (e.g. $\log_3 7 = \frac{\ln 7}{\ln 3}$)

§3.1 Slope of a Graph
- Be able to calculate equations of secant lines for a graph
- Know how to calculate the slope of the tangent line to a graph at a specific point
- Understand how to interpret the slope of a graph (as a tangent line, as a rate of change)

§3.2 Derivatives
- Know definition of the derivative as a limit
- What does the derivative of a function tell us?
- Know derivatives of x^m, constant functions, polynomials
- Know the constant rule and the sum rule
- Be able to find the equation for the tangent line of a function at a given point

§3.3 Derivative as a Rate
- The derivative of a function also gives the rate at which the function is changing
- The derivative of a position function gives velocity; the derivative of velocity gives acceleration.

§3.4 Differentiability
- One can approximate a function near a point using the tangent line.
- What does it mean for a function to not be differentiable at a point?
- What is the relationship between differentiability and continuity?
- Give examples of functions which are not differentiable

§3.5 and §3.6 and §3.7 Derivative of Logarithms and Exponentials and more Rules
- Know the derivative of $\ln x$ and e^x
- Know the product, quotient and chain rules (quotient rule is really chain rule in disguise)
- Know how to use these rules to calculate derivatives