Study Guide for Exam 1
Math 1100-4

Formulas to Know:
Note: No formulas will be provided on the exam.

- Average Rate of Change $= \dfrac{f(b) - f(a)}{b - a}$

- Quadratic Formula: $x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

- $\sqrt[n]{x} = x^{1/n}$

- $\dfrac{1}{x^n} = x^{-n}$

- $x^0 = 1$

- $x^1 = x$

Derivative Formulas: If c and n represent constants, and u, ν, f, and g are differentiable functions of x, then

- Limit definition of the derivative: $f'(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$

- $\dfrac{d}{dx} c = 0$

- $\dfrac{d}{dx} x^n = nx^{n-1}$

- $\dfrac{d}{dx} \big[c \cdot g(x) \big] = c \cdot g'(x)$

- $\dfrac{d}{dx} \big[u(x) \pm \nu(x) \big] = u'(x) \pm \nu'(x)$

- $\dfrac{d}{dx} \big[u(x) \cdot \nu(x) \big] = u(x) \cdot \nu'(x) + \nu(x) \cdot u'(x)$

- $\dfrac{d}{dx} \dfrac{u(x)}{\nu(x)} = \dfrac{\nu(x) \cdot u'(x) - u(x) \cdot \nu'(x)}{[\nu(x)]^2}$

- $\dfrac{d}{dx} \big[g(x) \big]^n = n \big[g(x) \big]^{n-1} \cdot g'(x)$

Section 9.1

- Know how to find the limit of a function when its graph is given.
- Be able to calculate limits of polynomial functions and rational functions.
- Be able to recognize when a limit does not exist.
- Know how to calculate the limit from the right and the limit from the left.

Section 9.2

- Know the three conditions that must hold in order for a function to be continuous at a point.
- Be able to determine where a function is discontinuous, including for rational functions and piecewise functions.
- Be able to find the vertical asymptotes of rational functions.
- Know how to calculate limits at infinity, and use this information to find the horizontal asymptotes of a function.

Section 9.3

- Know how to calculate the average rate of change of a given function on an interval.
- Be able to use the limit definition to find the derivative.
- Be able to use the derivative to calculate the instantaneous rate of change, as well as the slope of the line tangent to the graph of a function at a given value of x.

Section 9.4

- Know when and how to use the Power Rule, the Constant Function Rule, the Constant Coefficient Rule, and the Sum and Difference Rules to calculate derivatives.

Section 9.5

- Know when and how to use the Product Rule to find derivatives of the product of functions of x.
- Be able to use the Quotient Rule to find derivatives of fractional functions of x.

Section 9.6

- Recognize when to use the General Power Rule (or the Chain Rule) and be able to use it to find derivatives.

Section 9.7

- Be able to recognize when to use the derivative formulas from the previous sections, and be able to combine them to take derivatives of more complicated functions.

Section 9.8

- Be able to take second derivatives, and recognize the notation for second derivatives.
- Know how to calculate third derivatives, and be able to recognize the notation.

Section 9.9

- Know how to calculate the marginal revenue, marginal profit, and marginal cost functions when given the total revenue, profit, and cost functions, respectively.

- Be able to interpret the marginal functions.

Section 10.1

- Be able to find the critical values of a function.

- Know how to find when a function is increasing and when it is decreasing.

- Be able to use the First Derivative Test to find the relative maxima, relative minima, and horizontal points of inflection of a given function.

- Be able to use information about where a function is increasing and decreasing, as well as relative maxima and minima and intercepts, to graph a function.

Section 10.2

- Be able to find where a function is concave up and concave down, as well as its points of inflection, and use this information when graphing functions.

- Know how to use the Second Derivative Test to find the relative maxima and minima.

Other

- Review properties of exponents.

- Be able to solve equations by factoring, using the quadratic formula, or other methods.

- Finding the $x-$intercepts and the $y-$intercept of a function can be helpful when graphing.