

Math 111 Calculus 1

Final ODK Study Guide Spring 2011

Terms/Definitions/Theorems to Know

- Function, including polynomial, rational, exponential, logarithmic, and your trig and inverse trig functions.
- Graphs, including odd, even and periodic graphs/functions.
- Inverse function, and how our particular inverse pairs ($\sin(x)/\arcsin(x)$, $e^x/\ln(x)$, etc.) are related. Also when a function has an inverse and how the graph of a function and its inverse are related.
- Derivative, especially thought of as instantaneous rate of change and slope of the tangent line.
- Local linearity.
- Local extrema, global (or absolute) extrema, and critical points.
- Increase, decrease, concavity, inflection point.
- The limit definition of derivative.
- Rules for computing simple limits.
- Continuity (formal and informal definition).
- Limits involving infinity (without l'Hôpital's Rule).
- The Intermediate Value Theorem, The Extreme Value Theorem, and the Mean Value Theorem.
- The relationship between differentiable and continuous functions.
- Antiderivatives and what the "+C" means.
- Differential equation, initial value problem, and order of a differential equation.
- The Product, Quotient, and Chain Rules.

- Higher order derivatives.
- Theorem for computing derivatives of inverse functions.
- Indefinite integral.
- Definite integral, with both numerical and variable limits of integration.
- The area function.
- The Fundamental Theorem of Calculus, both versions.

Know How To . . .

- Find the domain and range of a function.
- Sketch a graph of a translated/compressed/expanded basic function.
- Use the graph of a function to find information about its derivative.
- Use the derivative or graph of the derivative of a function to find information about where the function is increasing/decreasing, concave up/down, and has maxima/minima and points of inflection.
- Find a derivative using the limit definition.
- Evaluate simple limits, including limits involving infinity. Find horizontal and vertical asymptotes.
- Find derivatives and antiderivatives (k , x^n , e^x , 2^x , $\ln(x)$, $\arcsin(x)$, $\arctan(x)$, $\sin(x)$, $\cos(x)$, . . . , combinations of functions such as products, quotients, and compositions, . . .).
- Find and classify extrema using the First Derivative Test.
- Find and classify extrema using the Second Derivative Test.
- Check the solutions to differential equations and initial value problems.
- Solve differential equations of the form $y' = ky$.
- Find derivatives using implicit differentiation.

- Work with parametric curves – eliminate the parameter, compute the speed of a particle, compute the slope of the curve, solve trajectory problems.
- Solve optimization problems.
- Solve related rates problems.
- Evaluate integrals using geometric arguments.
- Find area using one or more definite integrals.
- Evaluate integrals using the Fundamental Theorem of Calculus.
- Use the Fundamental Theorem of Calculus to solve tangent line problems, questions about a function defined in terms of an integral, etc.
- Find antiderivatives by substitution.
- Evaluate definite integrals using substitution.

Adapted from a review sheet created by Bob Milnikel, Kenyon College.