Math 262
Exam 2 Review Sheet

Section 7.1 Inverse Functions

• Understand the definition of a one-to-one function and be able to determine whether or not a given function is one-to-one.
• Understand the definition of an inverse function and be able to find an equation for the inverse of a function algebraically.
• Know and be able to apply the theorem on the composition of inverse functions. Also be able to find the domain, range, and sketch the graph of the inverse of a function.
• Know and be able to find the derivative of the inverse of a function at a given point.

Section 7.2 - 7.3 Logarithmic and Exponential Functions

• Memorize the definition of the natural logarithmic function and the properties of logarithms.
• Understand the shape and properties of the graph of the natural logarithmic function.
• Be able to compute derivatives of functions involving the natural logarithm and also be able to do logarithmic differentiation.
• Understand the definition of the natural exponential function as the inverse of the natural logarithmic function. Also know the definition of e and the shape of the graph of the exponential function.
• Be able to apply the properties of inverse functions to expressions involving the natural exponential and logarithmic function.
• Be able to differentiate functions involving the natural exponential function.
• Be able to find definite and indefinite integrals involving the natural logarithmic and the natural exponential function.
• Memorize and be able to apply the integration formulas for all 6 trigonometric functions.
• Understand the definition of general exponential and general logarithmic functions.
• Be able to rewrite general exponential and general logarithmic functions as natural exponential and logarithmic functions.
• Be able to compute derivatives and definite and indefinite integrals involving general exponential and logarithmic functions.

Section 7.4 Exponential Change and Separable Differential Equations

• Memorize the law of growth/decay (the general solution to the differential equation $\frac{dy}{dx} = ky$) as well as Newton's Law of Heating an Cooling.
• Be able to use separation of variables to solve a differential equation and be able to incorporate an initial condition into the general solution to a differential equation.
• Be able solve application problems involving growth, decay, or other related applications.

Section 7.5 Indeterminate Forms and L'Hôpital's Rule.

• Understand the hypotheses of L'Hôpital's Rule and be able to verify whether or not a given limit can be evaluated using L'Hôpital's Rule. [basic forms: $\frac{0}{0}$, $\frac{\infty}{\infty}$]
• Be able to change the form of a limit so that L'Hôpital's Rule can be applied to evaluate it. [basic forms: $0 \cdot \infty$, $\infty - \infty$, 0^0, 1^∞, ∞^0]
• Be able to compute a variety of limits using standard methods and/or L'Hôpital's Rule

Section 7.6 Inverse Trigonometric Functions

• Understand the definition of $\arcsin x$, $\arccos x$, $\arctan x$, and $\operatorname{arcsec} x$.
• Understand the inverse function properties, domain, range, and graphs of each the inverse trigonometric functions.
• Be able to compute "key values" of both trigonometric and inverse trigonometric functions *exactly*.
• Be able to do computations involving trigonometric and inverse trigonometric functions by solving triangles using the Pythagorean Theorem.
• Be able to find solutions to trigonometric equations using inverse trigonometric functions.
• Memorize the differentiation formulas for the inverse trigonometric functions and be able to apply them in various situations.
• Memorize the integration formulas involving inverse trigonometric functions and be able to apply them in various situations.