

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 apply theorems about continuity and the derivative of the inverse of a function.

**Section 7.2** The Natural Logarithm Function

- 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.

**Section 7.3** The Natural Exponential Function

- 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.

**Section 7.4** Integration (Involving Exponential and Logarithmic Functions)

- 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.

**Section 7.5** General Exponential and Logarithmic Function

- Understand the definition of general exponential and general logarithmic functions.
- Be able to rewrite general exponential and 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 7.6** Laws of Growth and Decay

- Memorize the law of growth/decay (the general solution to the differential equation  $\frac{dy}{dx} = ky$ ).
- 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 8.1** 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.

**Section 8.2** Derivatives and Integrals Involving 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.

**Section 9.1** Integration by Parts

- Know and be able to apply integration by parts (along with other techniques) in order to evaluate integrals.
- Understand how to apply integration by parts multiple times in order to evaluate integrals.

**Section 9.2** Trigonometric Integrals

- Understand how to rewrite integrands involving trigonometric functions using Pythagorean identities.
- Understand how to rewrite integrands involving trigonometric functions using half angle (power reduction) identities.
- Be able to evaluate various integrals involving powers of trigonometric functions.