

## Calculus II: Midterm 1 Study Sheet

- The definition of the derivative function. Calculating the derivative function from the definition.
- Trig review. Definitions of the sine, cosine, tangent, cotangent, secant, and cosecant functions. Graphs of  $\sin(x)$ ,  $\cos(x)$ ,  $\tan(x)$ . Derivatives of all 6 trig functions and corresponding integrals, i.e. since  $(\tan(x))' = \sec^2(x)$  the corresponding integral you should know is  $\int \sec^2(x)dx = \tan(x) + c$ .
- Derivative formulas. Product rule, quotient rule, power rule, chain rule. Implicit differentiation.
- Definition of the integral. Riemann sums. Calculating integrals (for linear & quadratic functions) using the definition of the integral. Summation notation.
- Graph sketching. Using derivatives to determine when a function is increasing/decreasing concave up/down. Sketching the graph of the derivative from the graph of the function.
- The Fundamental Theorem of Calculus. Using algebra to simplify and integrate.
- Integrals using u-substitution.
- Applications of integration. Area between curves. Volumes of solids.
- Inverse functions. One-to-one functions. Finding an inverse function. Graphs of inverse functions.
- Exponential functions and log functions. Rules of exponents and logs. Graphs of exponential and log functions. Derivatives of exponential and log functions and corresponding integrals. Solving equations with exponential and logs.
- Inverse sine and tangent function. Restricted domains.  $y = \sin^{-1}(x)$  means \_\_\_ AND \_\_\_.  $y = \tan^{-1}(x)$  means \_\_\_ AND \_\_\_. Evaluating inverse trig functions. Derivatives of  $\sin^{-1}(x)$  and  $\tan^{-1}(x)$ , and corresponding integrals.
- Limits in indeterminate form. L'Hôpital's rule.