Math 262
Exam 1 Review Sheet

Calculus I Review

• Understand and be able to compute two-sided limits, one-sided limits, and limits involving infinity.
• Memorize the derivatives of functions including trigonometric functions and be able to apply differentiation rules including the product, quotient and chain rules.
• Understand how to use the first and second derivative of a function to explore the shape of the graph of a given function.
• Understand implicit differentiation and be able to find the equation of a tangent line to both implicit and explicit functions.
• Know the statements of the Intermediate Value Theorem, the Mean Value Theorem, the Extreme Value Theorem and both parts of the Fundamental Theorem of Calculus.
• Be able to evaluate both definite and indefinite integrals both my reversing standard derivative formulas and by carrying out a change of variables (substitution).

Section 6.1 Area

• Be able to find the Area between a function and the x-axis using the Fundamental Theorem of Calculus.
• Be able to find the area of a region enclosed between two functions $f(x)$ and $g(x)$ with $f(x) > g(x)$ (perhaps on an given interval) by setting up a definite integral and applying the Fundamental Theorem of Calculus.
• Be able to find the area of a region enclosed between two functions $f(y)$ and $g(y)$ with $f(y) > g(y)$ (perhaps on an given interval) by setting up a definite integral and applying the Fundamental Theorem of Calculus.
• Be able to find the area of a region bounded by more than two functions or a region bounded by functions that cross each other one or more times.

Section 6.2 and 6.3 Solids of Revolution: Disks, Washers and Cylindrical Shells

• Be able to find the volume of a solid formed by revolving a planar region about either a vertical or horizontal line by setting up and evaluating a definite integral consisting of circular cross sections.
• Be able to find the volume of a solid formed by revolving a planar region about either a vertical or horizontal line by setting up and evaluating a definite integral consisting of cross sections in the shape of "washers".
• Be able to find the volume of a solid formed by revolving a planar region about either a vertical or horizontal line by setting up and evaluating a definite integral consisting of cross sections in the shape of "cylindrical shells".

Section 6.4 Volume by Cross Sections

• Be able to find the volume of a solid described by placing cross sections over a planar region each of conform to a given shape (such as a square, rectangle, semicircle, triangle, etc.) by setting up and evaluating a definite integral.
• Be able to find the volume of a solid by interpreting it as a solid over a planar region with cross sections whose area can be computed via a function of one of the coordinate variables by setting up and evaluating a definite integral.

Section 6.5 Arc Length and Surface Area

• Be able to find (or estimate) the arc length of a function on a given interval by setting up and evaluating a definite integral.
• Be able to find (or estimate) the surface area of a surface formed by rotating function on a given interval about either a vertical or horizontal line by setting up and evaluating a definite integral.

Section 6.6 Work

• Understand the basic definition of Work as: Work = (Force)·(distance).
• Memorize Hooke's Law for springs and be able to use it to find both the spring constant for a given spring and the work required to compress or stretch a given spring some distance.
• Be able to find the amount of work needed to perform a given task by setting up and evaluating a definite integral.

Section 6.7 Moments and Center of Mass

• Understand how to find the Moment and center of mass of a system of point masses along the x-axis.
• Understand how to find the Moments and center of mass of a system of point masses on the xy-plane.
• Understand how to find the Moment and center of mass of a planar lamina of constant density by setting up and evaluating definite integrals.
• Understand how to find the mass of lamina with given density function by setting up and evaluating a definite integral.