Math 323
Exam 1 Review Sheet

Section 13.1 and 13.2 Plane Curves

• Understand the definitions of plane curves and parametric equations.
• Given a parametrically defined plane curve, be able to find an equation in x and y whose graph contains the points on the curve, and be able to graph the curve, indicating its orientation.
• Be able to compute the slope of the tangent line to a point on the graph of a smooth plane curve that is parametrically defined. Also be able to find the equation for the tangent and normal lines at the given point.
• Be able to compute the second derivative at a point on the graph of a smooth plane curve that is parametrically defined.
• Be able to set up and evaluate a definite integral representing the arc length of a smooth plane curve that is parametrically defined.
• Be able to set up and evaluate a definite integral representing the surface area of a surface generated by revolving a parametrically defined, smooth plane curve about a line in the plane.

Section 13.3 and 13.4 Polar Coordinates

• Understand the definition of the polar plane and be able to plot points in terms of (r, θ) coordinates.
• Be able to accurately sketch the graph of various polar equations, indicating the orientation of the polar curve in the plane and labeling key points on the graph. It would be a good idea to familiarize yourself with the standard polar graphs and their equations on the polar graphing handout.
• Memorize the conversion equations between rectangular and polar coordinates and be able to translate polar equations into rectangular form and rectangular equations into polar form.
• Be able to find the slope of the tangent line to a point on a polar curve (either memorize the formula for computing the slope of an equation of the form $r = f(\theta)$ or understand how to adapt the method for general parameterized curves in the plane).
• Be able to recognize whether or not a given polar curve is symmetric with respect to the polar axis (you do not need to memorize the other tests of symmetry for polar graphs).
• Be able to set up and evaluate integrals representing the area within an enclosed polar region or the area either within or between two polar curves.
• Be able to set up and evaluate a definite integral representing either the arc length of a polar curve or the surface area of a surface generated by revolving a polar curve about either the polar axis or the line $\theta = \frac{\pi}{2}$.

Section 14.1 and 14.2 Vectors in Two or Three Dimensions

• Understand the difference between a vector and a scalar and how to find the vector given by an initial and terminal point either in the plane or in 3-space.
• Understand the definition or a position vector and how to write a vector in terms of its components in either the plane or in 3-space.
• Be able to compute the magnitude of a vector and be able to find a unit vector in the direction of a given vector.
• Understand both addition and subtraction of vectors computationally and geometrically.
• Understand the basic algebraic properties of vectors and scalar multiplication.
• Understand i, j and i, j, k notation for 2 and 3-dimensional vectors.
• Be able to find the components of a vector described in terms of its angle and magnitude.
• Be able to solve application problems involving either velocity or force vectors.
• Understand the basics of setting up a 3-dimensional rectangular coordinate system and be able to plot points in 3-space.
• Be able to compute the distance between two points in 3-space. Also be able to find the midpoint of a line segment in 3-space.
• Be able to graph spheres in 3-space and also be able to find the equation of a sphere from various descriptions (both graphical and algebraic forms).