

## Math 2950- Review Sheet for 1<sup>st</sup> Exam

The first exam is Monday Sept. 27 and will cover All of Chapter 13-14 plus sections 15.1, 15.2. As a good first step make sure you understand all the quiz problems and homework problems!

### Definitions/Formulas to know:

- Distance formula
- Equation of a sphere
- Vector addition and scalar multiplication and properties (p.838)
- Dot product and cross product, including properties (p. 843, 854)
- Work, torque
- Scalar and vector projection.
- Unit vector
- Vector, parametric and scalar equations of a line
- Vector and scalar equations of a plane
- Cylindrical and spherical coordinates
- Space curve, component functions
- Derivative of space curve, tangent vector, tangent line, unit tangent vector
- Differentiation rules (p. 895)
- Arc length formula
- Parameterized by arc length.
- Curvature formula
- Level curves
- Graph of a function of two variables
- Limit (p. 944), continuous

### Skills you should have:

- Neatly sketch surfaces in three dimensions, planes, hyperboloids, cylinders, etc..
- Describe regions of  $\mathbf{R}^3$  given by inequalities, sketch the regions
- Add vectors geometrically (with pictures) or algebraically
- Decide if 2 vectors are perpendicular, find the angle between two vectors, between two lines.
- Find the scalar and vector projection of a vector onto another vector.
- Find area of parallelogram, volume of parallelepiped.
- Find vector, parametric and scalar equation of lines given a point and a direction or two points.
- Find vector and scalar equation of a plane given three points, or two vectors in the plane, or a point and a normal vector.
- Go back and forth between different coordinate systems, sketch regions defined in terms of these coordinates.
- Sketch space curves, including labeling the direction of increasing  $t$ .
- Find unit tangent vectors to a space curve at a given point, also the tangent line to a space curve.
- Parameterize by arc length a given curve. (only those with constant speed)
- Calculate the arc length of a curve.
- Determine the curvature of a curve.
- Interpret derivatives of a parameterized curve as velocity and acceleration.
- Sketch graphs of functions of two variables, also level curves of functions of two or three variables.
- Determine where the functions have a limit which exists, also where they are continuous.

