Exam #1 objectives

For Exam #1, a well-prepared student should be able to

- compute the distance between two points in space using cartesian coordinates
- determine the center and radius of a sphere given a cartesian equation for the sphere
- determine the equation of a plane given appropriate information
- recall and use basic facts about special curves in the plane (lines, ellipses, parabolas, hyperbolas) and their corresponding equations in two variables
- sketch the ellipse, parabola, or hyperbola that corresponds to a given simple quadratic equation in two variables
- understand the relationship between an equation in three variables and solutions to that equation as coordinates for points in space
- use cross-sections to describe and sketch the surface given by a quadratic equation in three variables
- determine the boundary of a region; determine whether a region is open, closed, or neither; and determine whether a region is bounded or unbounded
- determine the domain and range of a function of two variables
- plot or describe both level sets and the graph of a simple function of two variables
- determine the domain and range of a function of three variables
- plot or describe level sets of a simple function of three variables
- analyze a limit of a function of two or more variables
- analyze continuity of a function of two or more variables
- use path limits to show that a given limit does not exist for a function of several variables
- state the definition of a partial derivative (as limit of a difference quotient)
- compute partial derivatives (including higher order ones) of a function of several variables
- understand and use equality of mixed partial derivatives (when relevant)
- read, with understanding, the various notations for partial derivatives
- state and use an appropriate interpretation (rate of change or slope) of the partial derivatives of a function of several variables
- use an appropriate chain rule to compute or express derivatives for a given composition of functions