

**Exam #1 objectives**

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

- compute distance between two points in space using cartesian coordinates
- determine the center and radius of a sphere given a cartesian equation for the sphere
- 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
- understand the connections among the various forms for the equation of a plane, including the point-normal form
- determine the equation of a plane given appropriate information
- understand and draw relevant pictures for geometric views of vector, magnitude, direction, addition of vectors, scaling of a vector
- compute with component expressions for given vectors
- state and use a geometric expression for dot product
- state and use a component expression for dot product
- use algebraic properties of adding vectors, scaling vectors, and dot product of vectors to simplify vector expressions
- use the dot product to compute the angle between two given vectors
- compute the component or projection of a given vector in the direction of a second given vector
- use vectors to find coordinates of geometrically defined points
- use vectors to prove simple geometric facts