Outline for Exam 1

The exam will cover sections 10.1-10.4. The topics by section are

10.1 Points in $\mathbf{R}^3$. The distance formula in $\mathbf{R}^3$. Sets in $\mathbf{R}^3$ defined by systems of equations or inequalities. The equation of a sphere with given radius and center.

10.2 Scalars and vectors. Initial and terminal points, magnitudes of vectors, Vectors in component form. Vector addition, scalar multiplication and magnitudes of vectors in component form. The zero vector. The negative of a vector. Graphical vector algebra. Drawing resultant vectors and scalar multiples of vectors. Unit vectors. The standard unit vectors $\vec{\imath}$, $\vec{\jmath}$ and $\vec{k}$. Finding the unit vector with a given direction. Writing vectors in the form (magnitude) $\times$ (direction).

10.3 The dot product. The algebraic and geometric definitions of the dot product. Using the dot product to compute the angle between vectors. Orthogonal vectors. Projections and components.

10.4 The cross product. The geometric definition of the cross product. Determinants. Using the determinant to compute the cross product. Applications of cross prodcuts: Finding orthogonal vectors orthogonal to a plane, computing areas of parallelograms and volumes of parallelpipeds.