Topics for Exam 1

1. **Vector Space Structure in Euclidean Space**

   1.1 Definition of n–Dimensional Euclidean Space

   1.2 Vector addition and scalar multiplication

   1.3 Spans

   1.4 Linear independence

2. **Subspaces of Euclidean Space**

   2.1 Bases

   2.2 Dimension

   2.3 Coordinates

3. **Connections with the Theory of Linear Equations**

   3.1 Homogeneous systems

   3.2 Fundamental Theorem for homogenous systems of linear equations

   3.3 Nonhomogeneous systems

Relevant sections in text: 1.1, 1.2, 1.3, 1.4, 1.5 and 1.6.

Relevant sections in the online class notes: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10 and 2.11.

Relevant assignments: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11.

Important concepts: Euclidean space, linear independence, span, subspaces, bases, dimension and coordinates.

Important skills: Know how to determine whether subsets of $\mathbf{R}^n$ are linearly independent; know how to tell whether a given subset of $\mathbf{R}^n$ is a subspace; know how to tell whether a set of vectors in $\mathbf{R}^n$ spans a subspace; know how to compute the span of a set of vectors; know how to solve systems of linear equations; know how to determine bases for subspaces of Euclidean space; know how to compute dimensions of subspaces; know how to find coordinates of vectors relative to ordered bases.