Review is important, so here is some review for the test. It will cover Sections 3.4, 4.1, 4.3, 4.4, 5.1-3, 6.1-3, and a little of 9.1. This sheet is pretty comprehensive, so concentrate on the areas you are least comfortable with!

First, a list of the topics which will be covered.

- Systems of Linear Equations; how to find solutions to homogeneous and non-homogeneous systems, number of solutions in terms of parameters for a given system
- Matrices; definition and uses of rank (in chapter 3, 4, and 5), special types (triangular, diagonal, symmetric, elementary, invertible), spaces one gets from matrices
- Determinant; definition, calculation (using definition, other cofactor expansions, row-reduction, special theorems for triangular and matrix with zeros), relation to invertibility and solutions to systems of equations (Cramer’s rule, for instance)
- Vector Spaces; linear combinations of vectors, span of a set of vectors, definition of subspaces, linear independence of a set of vectors, spaces associated to matrices (row, column, and null), how to test for span and linear independence, definition and properties of basis, how to find bases for various subspaces, definition of dimension of a vector space (and how to determine that dimension using rank)
- Geometry in $\mathbb{R}^2$ and $\mathbb{R}^3$; definitions and properties of dot product, cross product, and norm, use of dot and cross product to show perpendicularity, relation of dot and cross product of two vectors to the angle between them, the projection of vectors (and use of this to create an orthogonal basis), applications of these in geometry (especially orthogonality and area)

Problems and examples from the text which are especially important to understand:

**Chapter 3.4:** Def. of rank, Thms. pp105-6; Probs. 1,2,5,7, and 12
**Chapter 4.1:** Defs., pp.121-5, Thm., p.122; Probs. 2,4,10, and 13
**Chapter 4.3:** Def./Thm., pp.136-7, Thm., p.138; Probs. 1 and 2
**Chapter 4.4:** Thms. p.141-2,145; Probs. 2,3, and 6
**Chapter 5.1:** Defs., pp.159-160,162, Thm., p.161; Probs. 2 and 4
**Chapter 5.2:** Defs., pp.169,171, Thms., p.170,173; Probs. 3,5, and 6
**Chapter 5.3:** Def., p.177, Thms., p.178,182-4; Probs. 2,4, and 6
**Chapter 6.1:** Defs. and Props., pp.189-192, Thms. p.194; Probs. 2,3, and 4
**Chapter 6.2:** Def., p.200, Thm., p.201, Exs., pp.201-202; Probs. 1-4
**Chapter 6.3:** Def., p.205, Thm., p.207, Exs., pp.209-212; Probs. 1,2,3, and 7
**Chapter 9.1:** Process, p.281, Thms., pp278-9; Prob. 1