MATH 341, REVIEW FOR FINAL EXAM

The exam will cover the material we have discussed in class and studied in homework, from Sections 2.3, 2.5, 2.8, 2.9, 3.1-3.3, 4.1-4.6. The following list points out the most important definitions and theorems.

Definitions:

LU factorization.
Subspace, null space, column space.
Linear transformation.
Linear independence, linear dependence, linear dependence relation (for vector spaces).
Spanning set, basis, coordinate vector.
Vector spaces, subspaces, dimension.
Rank of a matrix and of a linear transformation.

Theorems:

Chapter 2:
The Invertible Matrix Theorem (including new statements in Sections 3.2).
Theorem 10 (Column-Row expansion of AB).

Chapter 3:
Theorems 2, 3, 4, 5, 6 (properties of determinants).
The formula for det A as a product of pivots.
Theorem 7 (Cramer's Rule).
Theorems 9 and 10 (determinants as area or volume).

Chapter 4:
Theorems 1-3.
Theorem 7 (Unique Representation Theorem),
Theorem 8 (Coordinate systems).
Theorems 9, 10, 12 (Basis Theorems).
Know the proofs of Theorems 2 and 3.

Important Skills:

Write AB using a column-row expansion.
Construct an LU factorization of a matrix, use an LU factorization to solve $Ax = b$.
Compute a 3×3 or triangular determinant.
Compute a determinant using Theorems 3, 4, 5, 6.
Solve a 2×2 or 3×3 system using Cramer's Rule.
Determine if a set of vectors spans (or is a basis for) $\mathbb{R}^n$.
Determine if a set of polynomials spans (or is a basis for) $\mathbb{P}_n$.
Determine if a set is a subspace (using Theorems 1, 2, or 3 in Chapter 4).
Determine if a vector is in $Nul\ A$ or in $Col\ A$.
Find a nonzero vector in $Nul\ A$ or $Col\ A$.
Determine if a set is a basis for a subspace.
Find a basis for $Nul\ A$ or $Col\ A$, or for other subspaces of $\mathbb{R}^n$ or of $\mathbb{P}_n$.
Find the coordinate vector of a vector relative to a basis.
Use coordinate vectors to check if a set is linearly independent.
Find the dimension of a subspace.