Math 203 Required Topics for Test 2

Section 1.9

- Find the matrix of a given transformation (by finding $T(e_1)$, $T(e_2)$, . . . $T(e_n)$).
- Given A, the matrix of a linear transformation T, find the domain and co-domain of T
- Determine whether a given transformation T: $R^n \rightarrow R^m$ is one-to-one
- Determine whether a given transformation T: $R^n \rightarrow R^m$ is onto R^m

Sections 2.1, 2.2, 2.3

- Find the sum or difference of two matrices
- Find the scalar multiple of a matrix
- Find the product of two matrices
- Find the inverse of a matrix (both the quick method for 2x2 matrices and the method involving row reduction for larger matrices)
- Use the invertible matrix theorem to answer questions about: span of a set of vectors, linear independence, existence and uniqueness of solutions to the matrix equation Ax=b, whether a transformation is one-to-one and onto.

Sections 3.1, 3.2

- Find the determinant of a given matrix by cofactor expansions (and by row reduction)
- Use the determinant to determine whether a given matrix is invertible.

Sections 4.1, 4.2, 4.3, 4.4

- Know the three subspace properties
- Determine whether a given *subset* of a vectorspace V is a *subspace* of V (by showing that it satisfies the definition or by writing it as the span of a set of vectors)
- Given a matrix A, find a non-zero vector (or two) in Col A
- Given a matrix A, find a non-zero vector (or two) in Nul A
- Determine whether a given vector is in Col A or Nul A
- Express a given subspace of R^n as Col A or Nul A for some matrix A
- Determine whether a given set of vectors is a basis for a given vector space (or subspace)
- Given a matrix A, find a basis for Col A
- Given a matrix A, find a basis for Nul A
- If V is a vector space with basis *B*, for a given vector x in V, find $[x]_B$
- If V is a vector space with basis *B*, given $[x]_B$, the coordinates of x relative to *B,* find the vector x.