Math 213 Final Review Sheet

(You do not need to know QR factorization)

Things you should know how to do because they were on every old final/practice final (or almost every old final/practice final)

* Find the SVD of a matrix
  + Find the outer product form of the SVD of a matrix
* Orthogonally Diagonalize a matrix (applies to symmetric matrices)
  + Find the spectral decomposition of a symmetric matrix
* Find a Basis for Wꓕ given the basis vectors for W.
* Find the orthogonal projection of a vector y
  + Find the perpendicular component of the projection of y onto W
* Find the matrix that corresponds to a give linear transformation
* Find the Inverse of a matrix (that is larger than 2X2)
* Use Gram-Schmidt Orthogonalization to create an orthogonal set of vectors from a given set of vectors
* Find the Determinant of a matrix
  + Or use properties of determinants to find the determinant of a matrix that isn’t given
* Solve a matrix equation for a given matrix
* Find the eigenvalues and eigenvectors of a given matrix
  + (often in the context of other problems like SVD, Diagonalization, etc.)
  + Find the Characteristic Polynomial of a square matrix (used to find Evals)
* Find the dimension of Row(A), Col(A), and Null(A) given the dimension and rank of A.

These two below were only on a couple of the old exams

* Find a basis for the four fundamental subspaces of a matrix: Row(A), Col(A), Null(A) and Col(A) ꓕ
* Find coordinates with respect to a given basis
* Find the diagonalization of a square matrix (if possible).
  + Use the diagonalization to find the power of a matrix

Things you should understand (know their properties, theorems, relationships to each other, etc)

* Orthogonal Matrices
* Symmetric Matrices/Orthogonally Diagonalizable matrices
* Invertible Matrices
* Eigenvalues/Eigenvectors
* Diagonalization and Alg/Geom multiplicities of evals, Linearly independent Evecs
* Solutions to a system of Ax=b
* Properties of Matrix/Vector Operations