Math 203: Required Topics for Test 3

Section 4.6 Rank of a Matrix

- Know how to find the dimension of Row A, for a given matrix A
- Know how to find the Rank of a given matrix
- Suggested problems: Page 236 3, 5-15 odd.

Section 4.7 Change of Basis

- Know how to find and use the change of basis matrix
- Suggested problems: Page 242 5, 7

Section 5.1 Eigenvectors and Eigenvalues

- Given a matrix A, determine whether a given vector is an eigenvector of A and if so, find the corresponding eigenvalue.
- Given a matrix A, determine whether a given value is and eigenvalue of A and so, if find the corresponding eigenvector(s)
- Given a triangular matrix, know how to find the eigenvalues
- Suggested problems: Page 271 5, 7, 11, 15

Section 5.2 The Characteristic Equation

- Know how to find the characteristic equation for a given matrix and use it to find the eigenvalues of the matrix.
- Suggested problems: Page 279 3, 5, 7, 9, 11

Section 5.3 Diagonalization

- Given a matrix A, know how to find matrices P and D so that $A=PDP^{-1}$
- Determine whether a matrix is diagonalizable.
- Suggested problems: Page 286 13, 15, 17

Section 5.4 Linear Transformations

- If T: $V \rightarrow W$ is a linear transformation, B is a basis of V, C is a basis of W, know how to find the matrix of the transformation T relative to bases B and C.
- If T: $V \rightarrow V$ is a linear transformation, B is a basis of V, know how to find the B-matrix of the transformation T.
- Suggested problems: Page 293 1, 5, 7, 11

Section 6.1 Inner Product, Length and Orthogonality

- Know how to find the dot product of two vectors
- Know how to find the length (or norm) of a vector and the distance between two vectors.
- Know how to determine whether two vectors are orthogonal
- Suggested problems: Page 336 7, 13, 17

Section 6.2 Orthogonal Sets

- Know how to determine whether a given set is an orthogonal set (or an orthogonal basis for a subspace)
- Given an orthogonal basis for a subspace W and any vector y in W, know how to write y as a linear combination of basis vectors using dot product calculations.
- Know how to find the orthogonal projection of a given vector onto a line (or subspace spanned by one vector)
- Know how to decompose a vector into two vectors, one in Span {u} and one orthogonal to u.
- Suggested problems: Page 344 5, 9, 11, 13, 15

Section 6.3 Orthogonal Projections

- Given a vector y in R^n and a subspace W of R^n know how to find the projection of y onto W and the distance from y to W
- Suggested problems: Page 352 1, 3, 7, 11