MTH215 section 1   Concepts for review
Mar 31, 2008

A list of concepts which you should understand for upcoming test 2.

(1) The vector spaces $\mathbb{R}^n$ and $\mathbb{P}_n$

(2) Subspaces of a vector space and determining if one space is a subspace of another

(3) The subspace generated by a set, ie the span of a set

(4) A basis for a space

(5) Finding a basis for a space given a spanning set

(6) The null space of a matrix and finding a basis for it

(7) The column space of a matrix and finding a basis for it

(8) Chart on pg 232 contrasting Nul A with Col A

(9) Relationship of the kernel of a linear transformation to the null space of its standard matrix

(10) Relationship of the range of a linear transformation to the column space of its standard matrix

(11) The connection between the linear transformation $T : \mathbb{R}^n \longrightarrow \mathbb{R}^m$ and the number of rows and columns in the standard matrix of T

(12) The properties and spaces of a matrix that row operations preserve and the ones they may destroy

(13) The change of coordinates matrix from $\mathcal{E}$ to $\mathcal{B}$ and from $\mathcal{B}$ to $\mathcal{E}$

(14) Relationship between $P_{\mathcal{B}}$ and $[x]_{\mathcal{B}}$

(15) The dimension of a vector space, the size of a basis set

(16) dim Col A and dim Nul A

(17) What the rank of a matrix is and how to find it

(18) The continuations of the invertible matrix theorem

(19) Eigenvalues and eigenvectors of matrices

(20) The relevance and usefulness of the matrix equations $Ax = \lambda x$ and $(A - \lambda I)x = 0$ and why the eigenspace of a matrix should remind us of a certain nullspace

(21) Checking if a given vector is an eigenvector of a given matrix

(22) Checking if a given number is an eigenvalue of a given matrix

(23) Finding the eigenvectors associated with an eigenvalue

(24) The special case of a triangular matix

(25) The significance of n distinct eigenvalues in a matrix of size n by n

(26) The characteristic polynomial, finding it using a determinant

(27) The significance of the solutions of the characteristic equation

(28) Finding the eigenvalues and eigenvectors of a small matrix by hand

(29) What similar matrices are and what they share

(30) Any concept found, or skill needed, in the homework of sections 4.1-4.6 or 5.1-5.2