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/m301.sp06/handouts301/t3_301_414/REVIEW/review_suggestions_2_tex

1 This list is now in final form.

2 Test #3 is Friday, 4/14/06.

3 The test will cover the accumulated course material with emphasis on the topics of assignmets #21 – #27.

4 Computations you need to be able to do:

(a) Reduce any matrix to RREF

(b) Interpret an RREF of $\boldsymbol{A}$ to find a null-space basis (like, when we're eigenshtiking)

(c) Evaluate determinants.

(d) Given an ordered basis $\boldsymbol{\mathcal{B}}$ for abstract vector space $\boldsymbol{V}$, and given $\vec{\boldsymbol{v}}$ in $\boldsymbol{V}$, compute $[\vec{\boldsymbol{v}}]_{\boldsymbol{\mathcal{B}}}$

(e) Given two ordered bases $\boldsymbol{\mathcal{B}}$ and $\boldsymbol{\mathcal{C}}$ for abstract vector space $\boldsymbol{V}$, compute whatever it is you need to convert from $[\vec{\boldsymbol{v}}]_{\boldsymbol{\mathcal{B}}}$ to $[\vec{\boldsymbol{v}}]_{\boldsymbol{\mathcal{C}}}$, and vice versa, for any vector $\vec{\boldsymbol{v}}$ in $\boldsymbol{V}$.

(f) Given a matrix and an eigenvalue for that matrix, find a basis for the affiliated eigenspace.

(g) Given a matrix, compute its eigenvalues.

(h) Given a prose description of a linear transformation, eyeball some of its eigenstuff.

(i) The transformation in problem 5.1: 31 has *two* distinct eigenvalues.

(j) Can you eyeball the eigenstuff for the transformations on pages 85-87? Which ones have a basis of eigenvectors for the entire domain space? Which ones don't?

(k) Given a transformation $\boldsymbol{T}$ and bases for its domain and for its codomain, find the matrix for $\boldsymbol{T}$ relative to the two bases.

(l) Given a transformation $\boldsymbol{T}$ whose range is contained within its domain space, and a basis for the domain space, find the square matrix for $\boldsymbol{T}$ relative to the basis. What change do we make to this matrix if the basis is changed?

5 In the old-tests collection:

(a) Test #1 problems 7 (B) and 7 (C).

(b) Test #2 parts that are fair game:

 (i) 3
 (ii) 6 (A) and 6 (B)

(c) Test-#3 fair-game parts:

 (i) 1
 (ii) 2 (c)
 (iii) 6 (all parts)

(d) Old-final-exam parts now relevant:

 (i) 4
 (ii) 5
 (iii) 6 (A), (C), (E), (Fb), (G), (H)

6 Know the basic definitions. Here is a list of the ones I believe to be new since test #2. Approach this in the spirit of Assignment #18: "definition + basic theorem". For many of these, it's helpful to have a list of entities which are examples of the thing being defined, and examples of things that aren't examples of the thing being defined.

(a) definition

(b) theorem

(c) counterexample

(d) dimension of a subspace

(e) rank of a matrix

(f) nullity of a matrix

(g) coordinates

(h) isomorphic vector spaces

(i) eigenvector for a matrix or transformation

(j) eigenvalue for a matrix or transformation

(k) the matrix of a linear transformation relative to bases in its domain and codomain.

(l) characteristic polynomial

(m) matrix similarity

(n) matrix diagonalizability

7 Here is a list of all our theorems since test #2. You need to know what they say.

(a) The Spanning-Set Theorem (page 239)

(b) The Pivot-Column-Basis Theorem (page 241)

(c) The Coordinates-are-Unique Theorem (page 246)

(d) The Coordinate-Isomorphism Theorem (page 250)

(e) The Dimension-Enabling Theorems (pages 256-7)

(f) Any Linearly-Independent Set is Contained in a Basis (page 259)

(g) If $\boldsymbol{V}$ is a dimension-$\boldsymbol{n}$ vector space, then (page 259)

   (i) an $\boldsymbol{n}$-element linearly-independent set is . . .

   (ii) an $\boldsymbol{n}$-element spanning set is . . .

(h) The Row-Space-Basis Theorem (page 263)

(i) The Rank-of-a-Matrix Theorem (page 265)

(j) Rank-and-Nullity Theorem for Nonsingular Matrices (page 267)

(k) The theorem on Change-of-Coordinates Matrices (page 273)

(l) The theorem on Linear Independence of Eignevectors (page 307)

(m) The Eigenvalues of a Nonsingular Matrix (page 312)

(n) The theorem on Eigenvalues of Similar Matrices (page 315)

(o) The theorems on when some matrices are diagonalizable (pages 320 and 323)

(p) Diagonal-Matrix-Representation Theorem (page 331)