Review Sheet for Math 20580, Fall '10, Exam 2

Disclaimer. The following review sheet represents a sincere attempt to help you prepare for the exam. It is not in any sense a practice exam. Nor is it necessarily complete. There might be things on the exam that are not mentioned directly here, problems that look different than the review problems suggested here, etc. Nonetheless, we think it's better than nothing...

Practical details. The exam runs from 8-9:15 AM Tuesday, 10/26 in Jordan 101. There will be a review session Monday 10/25 from 7-8 PM in Hayes-Healy 127. Homework *will* be collected on Friday 10/29 and tutorials will take place as usual on 10/28, but there will be no quiz during tutorial.

The exam will cover sections 3.1-3.3, 4.4 (see also 2.8 for stuff about coordinates), 4.7 and 5.1-5.5 from Lay's book. The format of the exam will be similar to that of the first one. *No calculators, books, or notes will be allowed.*

Things to know

Terminology and concepts. We stress again that it's very important to be comfortable with the *language* of linear algebra. Following are some words you should understand thoroughly for the exam.

determinants: cofactors of a matrix, cofactor expansion for a determinant,

general things: coordinates (of a vector with respect to a non-standard basis), change of coordinate matrix, matrix for a linear transformation relative to non-standard bases, similar matrices.

eigenstuff: eigenvalue and eigenvector of a matrix, eigenspace associated to an eigenvalue, characteristic polynomial, diagonalization of a square matrix.

Computational skills.

determinants: Finding the determinant of an $n \times n$ matrix by row reduction and cofactor expansion. Understanding the relationships among determinants, volume, invertibility of matrices, etc. Basic properties of determinants. I won't ask any questions about Cramer's Rule, or the associated formula for the inverse of a matrix.

general things: determining whether a subset of a vector space is a subspace; finding coordinates of a vector with respect to a given basis, finding the vector given it's coordinates; finding/using the change of coordinates matrix from one basis to another; finding the matrix of a linear transformation relative to given bases.

eigenvalues and eigenvectors: Testing whether a given vector is an eigenvector of a matrix, computing the characteristic polynomials, finding eigenvalues and eigenvectors (or rather bases for eigenspaces), diagonalizing a matrix, dealing with complex eigenvalues.

Review problems from the book.

Please note that at the end of each chapter in Lay there is a section of supplemental exercises. These make good practice.