

## Math 232, Review handout for final exam

### Definitions.

You should know what all the following terms mean. Give brief descriptions of each of them:

Rank of a matrix  $A$ :

Leading variable/free variable:

Inconsistent system:

Reduced row-echelon form of a matrix  $A$ :

Inverse of a matrix  $A$ :

Redundant vector:

Linear combination of vectors  $\mathbf{v}_1, \dots, \mathbf{v}_m$ :

Linear independence of a set  $\{\mathbf{v}_1, \dots, \mathbf{v}_m\}$ .

Subspace of a linear space  $V$ :

Basis of a subspace  $W$  of a linear space  $V$ :

Linear transformation from a linear space  $V$  to a linear space  $W$ :

Image of a linear transformation  $T$  (or a matrix  $A$ ):

Kernel of a linear transformation  $T$  (or a matrix  $A$ ):

Matrix of a linear transformation  $T : V \rightarrow V$  with respect to a basis  $B$ :

Determinant of a  $2 \times 2$  matrix:

Eigenvector of a matrix:

Eigenvalue of a matrix:

Eigenbasis for a matrix:

Similar matrices:

Diagonalizable matrix:

**Some useful techniques:**

1. How to find all solutions of a system of linear equations.
2. How to put a system of equations into matrix form.
3. How to multiply matrices
4. How to find the inverse of a matrix – or to show it has no inverse.
5. How to find the determinant of a matrix, and interpret the answer you get.
6. How to tell if a vector is in the span of a set of other vectors.
7. How to determine whether a set of vectors is a subspace.
8. How to find bases for the kernel and image of a matrix.
9. How to determine whether a set of vectors in a linear space is a basis.
10. How to show that a map is a linear transformation.
11. Find the coordinates of a vector with respect to a given basis.
12. Find the matrix of a linear transformation with respect to given bases.
13. Find the eigenvalues of a matrix.
14. Find a basis of the eigenspace associated to each eigenvalue of a matrix.
15. Determine whether a matrix is diagonalizable, and if so find the matrices  $S$  and  $D$ .