

MATH 271, WORKSHEET 8
MATRIX MULTIPLICATION, LINEAR SYSTEMS, AND THE EIGEN-PROBLEM

Problem 1. Multiply matrices.

Problem 2. Solve systems of equations using row reduction

Problem 3. Consider the matrix

$$A = \begin{bmatrix} 3 & 0 \\ 0 & -3 \end{bmatrix}.$$

(a) Compute $\det(A - \lambda I)$.

(b) Find the solutions λ for $\det(A - \lambda I) = 0$. These are your eigenvalues.

(c) Solve

$$(A - \lambda_1)\mathbf{v}_1 = \mathbf{0}$$

where λ_1 is your first eigenvalue. This will give you the corresponding eigenvector \mathbf{v}_1 .

(d) Solve

$$(A - \lambda_2)\mathbf{v}_2 = \mathbf{0}$$

where λ_2 is your first eigenvalue. This will give you the corresponding eigenvector \mathbf{v}_2 .

(e) Do you notice anything about the eigenvalues and the matrix A ? What about the $\det(A)$ and the eigenvalues?

Problem 4. Consider the matrix

$$A = \begin{bmatrix} 0 & 5 \\ 5 & 0 \end{bmatrix}.$$

Repeat the process given in Problem 1 to determine the two eigenvalues and eigenvectors for A .

Problem 5. Consider the matrix

$$A = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}.$$

What happens when we try to find

$$\det(A - \lambda I) = 0?$$

How must we resolve this issue?