

MATH 417, HOMEWORK 4
due February 4 *Winter, 2008*

Section 3.1

Problems 38, 44, 50

Section 3.2

Problems: 36, 40

Computing Bases

1. Test for linear dependence and extract a linearly independent subset which spans the same subspace of \mathbb{R}^6 as the following vectors:

$$\begin{bmatrix} 2 \\ 4 \\ 3 \\ -1 \\ -2 \\ 1 \end{bmatrix} \quad \begin{bmatrix} -4 \\ -8 \\ -6 \\ 2 \\ 4 \\ -2 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 1 \\ 2 \\ 1 \\ 3 \\ 1 \end{bmatrix} \quad \begin{bmatrix} 2 \\ 6 \\ 2 \\ -4 \\ -10 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 0 \\ -1 \\ 0 \\ 3 \\ 0 \\ 2 \end{bmatrix}$$

2. Find a basis for the image space and a basis for the kernel space of the following matrix:

$$\begin{bmatrix} 1 & 2 & 4 & 5 & 7 \\ 1 & 2 & 3 & 4 & 5 \\ -1 & -2 & 0 & 2 & 1 \end{bmatrix}$$

3. Find a matrix whose image space contains the vectors:

$$\begin{bmatrix} 1 \\ 3 \\ -1 \\ 0 \end{bmatrix} \quad \begin{bmatrix} 2 \\ 2 \\ -3 \\ 4 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 3 \\ 0 \\ -1 \end{bmatrix}$$

and whose kernel contains the vector

$$\begin{bmatrix} 7 \\ -1 \\ -7 \\ 1 \end{bmatrix}$$

4. Find a basis for the solution space of the following linear systems of homogeneous equations.

$$\begin{aligned} x + y + z + t &= 0 \\ 2x + 3y - z + t &= 0 \\ 3x + 4y + 2t &= 0 \end{aligned}$$