MATLAB: University of California, Davis

Computer LAB for Linear Algebra   Dr. Daddel

MATH 22AL   LAB # 6

Start Typing in MATLAB

16   Exercise 3

3.1) Enter the matrix A2= $\begin{bmatrix} 1 & 0 & 2 & 3 \\ 4 & -1 & 0 & 2 \\ 0 & -1 & -8 & -10 \end{bmatrix}$

Find a basis for $null(A2)$, you may use the ones from the previous section or compute it again. Call these vectors $N1$ and $N2$.

Recall that any linear combination of the basis vectors will be in the subspace.

That means $k1 * N1 + k2 * N2$ should be in the null-space of A2 no matter what k1 and k2 are. so $A2(k1 * N1 + k2 * N2) = 0$.

We can demonstrate this with the following commands:

for i = 1:10, k1 = round(10*rand(1)); k2 = -round(10*rand(1));
V(:,i) = k1*N1 + k2*N2;
AV(:,i) = A2*V(:,i);
end

Explanation: The rand function gives numbers between zero and 1 so multiplying by 10 and rounding off gives integers between zero and 10. Thus k1 and k2 are randomly chosen numbers.

Each column of the matrix V is a vector which is a linear combination of our basis vectors $N1$ and $N2$. The corresponding column in AV is the vector A2*(that column of V).

Claim AV should be a matrix of zeros.

Type	*A2V = AV*

to check what the loop did.

Wow! It works! All of the columns of V are in the null-space of A2!

3.2) Which of the following vectors are in the null-space of A2? (you need to enter these vectors in MATLAB as matrices, column vectors).

- v1= (5, -35, 81, 2)

- v2= (38, 104, 17, -24)

- v3= (-9, -26, -3, 5)

- v4= (1, 0, 1, 1)

Use MATLAB, then type the following and enter your answer in the following format:

If you decided v1 is in the null-space of A2 type :

type	% A2v1= is in null(A2)
otherwise type	% A2v1= is NOT in null(A2)