MATLAB: University of California, Davis

Computer LAB for Linear Algebra Dr. Daddel

MATH 22AL LAB # 6

17 Background, Reading Part : COLUMN SPACE

Recall that the column space of a matrix $A_{m\times n}$ is the span of the columns of A which is the set of all all possible linear combinations of the columns of the matrix.

if $A_1, A_2, \cdots, A_n$ are columns of A, then for any given vector

$$x = (x_1, x_2, \cdots, x_n)$$

the vector

$$A\mathbf{x} = x_1A_1 + x_2A_2 + \cdots + x_nA_n$$

is a linear combination of the columns of A and is in column space of A.

Using this equation you can write any linear combination of the columns of A as $A\mathbf{x}$ for some $\mathbf{x}$.

So the column space is the set of vectors $\mathbf{b}$ for which $A\mathbf{x} = \mathbf{b}$ is consistent.

Finding basis for column space of given matrix

- One way to find a basis for column space of a matrix A is to find a basis for the row space of A^t.
- The following method not only gives you a basis for column space of A, it will give you a basis consist of column vectors of A.