Exam 2: Wed April 3

- Material from 3.1-3.7

HW4 - HW2

Find bases for $\mathbb{R}^n$, $\mathbb{C}^n$, $\mathbb{N}^n(\mathbb{R})$

- determine $\text{dim. of each}$
- $\text{rank}(A) + \text{dim} \mathbb{N}(A) = n$

Know the relationship between column space and solution to $Ax = b$

$Ax = b$ has a unique solution if and only if $b \in \mathbb{R}^n(\mathbb{A})$

Determine whether set of vectors forms a basis for a given vector space.

Determine if a set of vectors are in linearly independent.

Determine if a subset of a vector space forms a subspace.

Vector projections

The projection of $\bar{u}$ onto $\bar{v}$

$$\bar{w} = \left( \frac{\bar{u} \cdot \bar{v}}{\bar{v} \cdot \bar{v}} \right) \bar{v}$$

One thin to find a vector $\bar{p}$ which is orthogonal to $\bar{v}$

$$\bar{p} = \bar{u} - \bar{w}$$

Annunc. $Ax = b$ has a solution, then there are $x_1, \ldots, x_n \in \mathbb{R}$

$$x_1 \bar{a}_1 + x_2 \bar{a}_2 + \cdots + x_n \bar{a}_n = \bar{b}$$

where $\bar{a}_1, \bar{a}_2, \ldots, \bar{a}_n$ are the column vectors of $A$. Then $\bar{b}$ is a linear combination of the column of $A$.

So by definition, $\bar{b} \in \mathbb{R}^n(\mathbb{A})$. 

3/29/19