

## Math 4A Week 5 – November 3, 2014

1. Is the  $x$ -axis on the  $xy$ -plane a vector space?

2(i). Is  $\mathbb{R}^2$  a subspace of  $\mathbb{R}^3$ ?

2(ii). Is  $\{A \in M_{2 \times 2} : \det(A) = 1\}$  a subspace of  $M_{2 \times 2}$ ?

3(i). Is  $\left\{\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 1 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 \\ 0 \\ 3 \end{pmatrix}\right\}$  a basis of  $\mathbb{R}^3$ ?

3(ii). Let  $S$  be a linearly independent set in  $\mathbb{R}^2$ . Does it contain a basis for  $\mathbb{R}^2$ ?

4. Given matrix  $A$ ,

$$A = \begin{bmatrix} 3 & 8 & 0 & 0 & 0 \\ 0 & 0 & 5 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

(i). Is  $(\frac{1}{3}, \frac{1}{8}, 0, 0, 0)$  in the Null space of  $A$ ?

(ii).  $\text{Nul}(A)$  is a subspace of  $\mathbb{R}^n$ .  $n = ?$  What is the dimension of  $\text{Nul}(A)$ ?

(iii)  $\text{Col}(A)$  is a subspace of  $\mathbb{R}^m$ .  $m = ?$  What is the dimension of  $\text{Col}(A)$ ?