11/3/2023

4.3 Homework

1. is a base for $\mathbb{R}^3$
   piviot in every row + square

2. not a base, zero vecto makes them dependent

8. row reduces to:

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & -3/2 \\ 0 & 1 & 0 & -1/2 \\ 0 & 0 & 1 & 1/2 \end{array}\right] \Rightarrow \text{independent}$$

so = base for $\mathbb{R}^3$

13. $$\vec{x} = \begin{bmatrix} -6 \\ -5/2 \\ 1 \\ 0 \end{bmatrix} x_3 + \begin{bmatrix} -5 \\ -3/2 \\ 0 \\ 1 \end{bmatrix} x_4$$

$$\text{Nul}\,A = \left\{ \begin{bmatrix} -6 \\ -5/2 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} -5 \\ -3/2 \\ 0 \\ 1 \end{bmatrix} \right\}$$

$$\text{Col}\,A = \left\{ \begin{bmatrix} -2 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} 4 \\ -6 \\ 9 \end{bmatrix} \right\}$$

14. $\sim \quad \vec{x} = \begin{bmatrix}-2\\1\\0\\0\\0\end{bmatrix}x_2 + \begin{bmatrix}-4\\0\\7/5\\1\\0\end{bmatrix}x_4$

$\text{Nul}A = \left\{ \quad \right\}$

$\text{Col}A = \left\{ \begin{bmatrix}1\\2\\1\\3\end{bmatrix}, \begin{bmatrix}-5\\-5\\0\\-5\end{bmatrix}, \begin{bmatrix}-3\\2\\5\\-2\end{bmatrix} \right\}$

19. $4v_1 + 5v_2 - 3v_3 = 0 \Rightarrow v_3 = \frac{4}{3}v_1 + \frac{5}{3}v_2$

$\alpha v_1 + \beta v_2 = 0$

$\left[\begin{array}{cc|c} 4 & 1 & 0 \\ -3 & 9 & 0 \\ 7 & -2 & 0 \end{array}\right] \sim$

$\begin{array}{cc|c} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 0 \end{array}$

$\beta = 0$

$\alpha = 0$

$\{v_1, v_2\}$ is a basis for H

22.

a. False Ex. 10
b. True THM 5
c. True Two views of a basis section

29. $M = n \times m$: $m < n$

M can have at most m pivot colums.

THM 4 $\Rightarrow$ if m pivot colums and n rows and $n > m$ then

M $\in$ pivot in every column

then M $\neq$ span $\mathbb{R}^n$

30. = dependent because not square THM 8

33. independent because

neither equation is a scalar combination of the other

S.T. 4.3

- H = subset of vector space V

Basis = linearly independent set in H that spans H

- linearly independent means only trivial solution to $v_1 + v_2 \dots + v_n = 0$

~~set~~ all combination of vectors in set reach all points of said points