

HW03

MATH 102, WINTER 2018

DUE WEDNESDAY, JAN 31

NAME:

1. Construct a matrix whose column space contains $\begin{bmatrix} 1 \\ 1 \\ 5 \end{bmatrix}$ and $\begin{bmatrix} 0 \\ 3 \\ 1 \end{bmatrix}$, and whose nullspace contains $\begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$.

2. Find the column space and nullspace of A and the solution to $A\mathbf{x} = \mathbf{b}$:

$$A = \begin{bmatrix} 1 & 1 & 2 & 2 \\ 2 & 5 & 7 & 6 \\ 2 & 3 & 5 & 2 \end{bmatrix} \quad \text{and} \quad \mathbf{b} = \begin{bmatrix} 4 \\ 3 \\ 5 \end{bmatrix}.$$

3. Find two independent vectors on the plane $x + 2y - 3z - t = 0$ in \mathbb{R}^4 . Then find three independent vectors. Why not four? This plane is the nullspace of what matrix?

4. Describe the four subspaces of \mathbb{R}^4 associated with

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 0 & 0 & 0 \end{bmatrix} \quad \text{and with} \quad I + A = A = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}.$$