

## Homework 5

1. Determine the null space of each of the following matrices:

$$\begin{bmatrix} 2 & 1 \\ 3 & 2 \end{bmatrix}, \quad \begin{bmatrix} 1 & 2 & -3 & -1 \\ -2 & 4 & 6 & 3 \end{bmatrix}, \quad \begin{bmatrix} 1 & 1 & -1 & 2 \\ 2 & 2 & -3 & 1 \\ -1 & -1 & 0 & -5 \end{bmatrix}.$$

2. Determine whether the following are bases:

- $S = \{(3, -2), (4, 5)\}$  for  $\mathbb{R}^2$
- $S = \{(1, 5, 3), 0, 1, 2), (0, 0, 6)\}$  for  $\mathbb{R}^3$ .

3. The vector  $\mathbf{x}$  has coordinates  $(3, 7)$  in the basis  $B = \{(1, -2), (4, 5)\}$ . What are the coordinates of this vector in the basis  $B' = \{(3, 1), (4, 2)\}$ ?
4. The vector  $\mathbf{x}$  has the coordinates  $(4, 1)$  in the basis  $B = \{(2, 1), (1, 2)\}$ . What are its coordinates in the standard basis?