4-8 In-Class Exercise

1. Find the vector form of the general solution of the linear system $A\mathbf{x} = \mathbf{b}$, and then use that result to find the vector form of the general solution of $A\mathbf{x} = \mathbf{0}$.

$$\begin{aligned} x_1 + x_2 + 2x_3 &= 5 \\ x_1 \phantom{{}+x_2} + x_3 &= -2 \\ 2x_1 + x_2 + 3x_3 &= 3 \end{aligned}$$

2. Find a subset of the given vectors that forms a basis for the space spanned by those vectors, and then express each vector that is not in the basis as a linear combination of the basis vectors.

$$\mathbf{v}_1 = (1,0,1,1),\ \mathbf{v}_2 = (-3,3,7,1),$$
$$\mathbf{v}_3 = (-1,3,9,3),\ \mathbf{v}_4 = (-5,3,5,-1)$$

4-8 Suggested Exercises

1. Find bases for the null space and row space of A.

$$A = \begin{bmatrix} 1 & 4 & 5 & 2 \\ 2 & 1 & 3 & 0 \\ -1 & 3 & 2 & 2 \end{bmatrix}$$

2. **a.** Find the bases for the row space and column space of A

$$A = \begin{bmatrix} 1 & -2 & 5 & 0 & 3 \\ -2 & 5 & -7 & 0 & -6 \\ -1 & 3 & -2 & 1 & -3 \\ -3 & 8 & -9 & 1 & -9 \end{bmatrix}$$

b. Find a basis for the row space of A that consists entirely of row vectors of A.

3. Find a basis for the subspace of R^4 that is spanned by the given vectors.

$$(1, 1, -4, -3),\ (2, 0, 2, -2),\ (2, -1, 3, 2)$$