89 70

17. (10 points) Let W be the subspace of $\mathbb{R}^4$ which is spanned by

$$\begin{bmatrix} 1 \\ 3 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 1 \\ -2 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \\ -2 \\ 1 \end{bmatrix}, \begin{bmatrix} 1 \\ 2 \\ 2 \\ 2 \end{bmatrix}.$$

Find a basis for W.

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

$R3 \mapsto R3 + R1$ $\qquad$ $R2 \leftrightarrow R3$ $\qquad$ $R2 \leftrightarrow \frac{1}{3}R2$ $\qquad$ $R3 \mapsto R3 + 5R1$

$R2 \mapsto R2 - 3R1$ $\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad$ $R4 \mapsto R4 + 2R1$

$$\begin{bmatrix} 1 & 2 & -1 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -1 & 4 \\ 0 & 0 & -1 & 4 \end{bmatrix} \quad \begin{bmatrix} 1 & 2 & -1 & 1 \\ 0 & 1 & -1 & 1 \\ 0 & 0 & -1 & 4 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$\boxed{\begin{bmatrix} 1 \\ 3 \\ -1 \\ 0 \end{bmatrix}, \begin{bmatrix} 2 \\ 1 \\ 1 \\ -2 \end{bmatrix}, \begin{bmatrix} -1 \\ 1 \\ -2 \\ 1 \end{bmatrix}}$$