1. Find a basis for the space spanned by the vectors $\left\{ \begin{bmatrix} 9 \\ 3 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} -1 \\ 4 \\ 2 \\ -3 \end{bmatrix}, \begin{bmatrix} 0 \\ 1 \\ 1 \\ -1 \end{bmatrix}, \begin{bmatrix} 7 \\ 5 \\ 3 \\ 2 \end{bmatrix} \right\} = \mathcal{B}$

row reduces to the identity

Spans $\mathbb{R}^4$, basis for $\mathbb{R}^4$

2. Given the basis $\{2 - t, t + t^2, 3t^2 - t^3, 1 + 4t^3\}$ for $\mathbb{P}_3$, find the representation of $p(t) = 5t^2 - 3t + 17$ in this basis. Clearly label your change of basis matrix and correct notation for each vector used.

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

$$P_B^{-1} \begin{bmatrix} 17 \\ -3 \\ 5 \\ 0 \end{bmatrix} = \begin{bmatrix} 196/23 \\ 127/23 \\ -4/23 \\ -1/23 \end{bmatrix}$$