

**Problem 1.** Compute the change-of-basis matrix  $P_{\mathcal{C} \leftarrow \mathcal{B}}$  where

$$\mathcal{B} = \left\{ \begin{pmatrix} 3 \\ 2 \\ 9 \end{pmatrix}, \begin{pmatrix} 8 \\ 12 \\ 8 \end{pmatrix}, \begin{pmatrix} 10 \\ 2 \\ 6 \end{pmatrix} \right\} \text{ and } \mathcal{C} = \left\{ \begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 0 \\ 2 \\ 0 \end{pmatrix}, \begin{pmatrix} 3 \\ 0 \\ 1 \end{pmatrix} \right\}$$

are bases of  $\mathbb{R}^3$ .