MATH 54 SUMMER 2017, QUIZ 5

Let $T\colon \mathbb{R}^3 \to \mathbb{R}^2$ defined by

$$T\left(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}\right) = \begin{bmatrix} x_1 + 5x_2 - 2x_3 \\ 5x_2 + x_3 \end{bmatrix}.$$

T is a linear transformation (you do not have to check this). Find the standard matrix of T and find a vector $\mathbf{v} \in \mathbb{R}^3$ such that

$$T(\mathbf{v}) = \begin{bmatrix} 5 \\ 4 \end{bmatrix}.$$