1) Find the determinant of the matrix $\begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$.

$$5 \cdot 2 - 1 \cdot 4 = 6$$

2) Calculate the following:

$$\begin{vmatrix} 2 & 0 & 0 \\ 3 & 4 & 5 \\ 7 & 6 & 1 \end{vmatrix}$$

$$2 \cdot \begin{vmatrix} 4 & 5 \\ 6 & 1 \end{vmatrix} - 0 + 0 = 2 \cdot (4 - 30) = -52$$

3) Consider the linear operator $T: \mathbb{R}^2 \to \mathbb{R}^2$ given by $T\left(\begin{bmatrix} x_1 \\ x_2 \end{bmatrix}\right) = \begin{bmatrix} x_1 \\ 2x_1 \end{bmatrix}$. Find the determinant of the associated matrix $[T]$.

$$\begin{vmatrix} 1 & 0 \\ 2 & 0 \end{vmatrix} = 0 - 0 = 0$$