(1) (5 points) What is the Asteroid Belt?

(2) (10 points) An orthogonal basis for $\mathbb{R}^3$ is $\mathcal{B} = \left\{ \begin{bmatrix} 1 \\ 2 \\ 1 \end{bmatrix}, \begin{bmatrix} -2 \\ 1 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 \\ 1 \\ -3 \end{bmatrix} \right\}$. Find $[\mathbf{x}]_\mathcal{B}$

where $\mathbf{x} = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$ without solving a linear system or using matrices.

(3) (10 points) Diagonalize $\begin{bmatrix} 2 & 5 \\ 5 & -2 \end{bmatrix}$, if possible. Do not do extra work.