CROSS PRODUCT

1. Let $\vec{u} = u_x\,\hat{x} + u_y\,\hat{y} + u_z\,\hat{z}$ be a vector in $\mathbb{R}^3$. Determine two vectors $\vec{v}$ and $\vec{w}$ such that

    $$\vec{u} = \vec{v} \times \vec{w}.$$

    It is possible to solve this problem by brute force; find a better way if you can.
    HINT: What properties should $\vec{v}$ and $\vec{w}$ have?

    NOTATION:

    - u_x, u_y, u_z are constants, *not* partial derivatives;
    - $\hat{x}$, $\hat{y}$, $\hat{z}$ are the standard basis vectors in $\mathbb{R}^3$, also written as $\hat{i}$, $\hat{j}$, $\hat{k}$.