

**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  $\hat{i}, \hat{j}, \hat{k}$ .