QUESTIONS.

1. How can you characterize vector pairs which satisfy $\vec{u} \times \vec{v} = \vec{0}$.

2. You are given two vectors $\vec{v}, \vec{w}$ of length 3 and 3. How long can the vector $\vec{v} \times \vec{w}$ become maximally?

4. You are given 3 vectors of length $3, 4, 12$. How large can the triple scalar product between these two vectors become? What minimal value can it take?

5. You are given the product $\vec{i} \times \vec{j} \times \vec{i} \times \vec{j}$. Can you place brackets so that this product is not the zero vector?

6. What geometric condition is equivalent to $[\vec{u}, \vec{v}, \vec{w}] = 0$?

We use the notation $\vec{i} = \langle 1, 0, 0 \rangle$ and $\vec{j} = \langle 0, 1, 0 \rangle$ and $\vec{k} = \langle 0, 0, 1 \rangle$.
1) Which of the following products are the zero vector?

a) $(\vec{i} \times \vec{j}) \times \vec{i}$?
b) $(\vec{i} \times \vec{j}) \times \vec{j}$?
c) $(\vec{i} \times \vec{j}) \times \vec{k}$?

2) Which of the following products are zero?

a) $(\vec{i} \times \vec{j}) \cdot \vec{i}$?
b) $(\vec{i} \times \vec{j}) \cdot \vec{j}$?
c) $(\vec{i} \times \vec{j}) \cdot \vec{k}$?

3) Challenge: Define
$$T(\vec{v}) = (\vec{k} \times \vec{v})$$

What is
$$T(T(T(T(T(T(T(T(T(T(\vec{j}))))))))))\ ?$$

One applies T ten times to the vector $\vec{j}$.