

Homework 22

1. Let $\mathbf{u} = (1, 0, 2)$ and $\mathbf{v} = (3, 4, 1)$. Compute $\mathbf{u} \times \mathbf{v}$.
2. In the previous exercise, verify that $\mathbf{u} \times \mathbf{v} = -(\mathbf{v} \times \mathbf{u})$.
3. In the first exercise, use the dot product to verify that $\mathbf{u} \times \mathbf{v}$ is perpendicular to both \mathbf{u} and \mathbf{v} .
4. Let $A = (3, -1, 0)$, $B = (2, 4, -1)$, and $C = (1, 1, 3)$. Find a unit normal vector to the plane of the triangle ABC .
5. In the previous exercise, the triangle ABC has two unit normals, one in each of two opposite directions. You found one of them. What is the other one?
6. If $\mathbf{u} \times \mathbf{v} = \mathbf{0}$, then \mathbf{u} and \mathbf{v} are
 - (a) parallel.
 - (b) perpendicular.
 - (c) can't tell.
7. Given any two nonzero and nonparallel vectors \mathbf{u} and \mathbf{v} , explain why the vectors \mathbf{u} , $\mathbf{u} \times \mathbf{v}$, and $(\mathbf{u} \times \mathbf{v}) \times \mathbf{u}$ are mutually perpendicular (each one is perpendicular to the other two).