

Problem Set #2

Due Wednesday, September 21, 2005

1. In Problem 8 from section 12.1 on the last homework, you showed that a triangle was a right triangle. Show this fact another way, using the dot product.
2. Let $P_1, P_2, P_3,$ and P_4 be the vertices of a tetrahedron, and let C be the center of the tetrahedron. Find the angle between the vector from C to P_1 and from C to P_2 . (Complete the argument we started in class. For those who know chemistry, one way of thinking about the problem is computing the bond angle of methane, CH_4 .)
3. Find two different unit vectors that are orthogonal to $\langle 1, 1, 1 \rangle$ and $\langle 0, 2, -2 \rangle$.
4. If $\vec{v} \times \vec{w} = \langle 1, 2, 3 \rangle$ and $\vec{v} \cdot \vec{w} = 2$, find $\tan \theta$ where θ is the angle between v and w .
5. Suppose that the area of the parallelogram spanned by the vectors \vec{u} and \vec{v} is 5. What is the area of the triangle with vertices at $\vec{0}, \vec{u} + 2\vec{v}$, and $-3\vec{u} + \vec{v}$?