Discussion Worksheet, Aug 25

0.1. **Right angles and Dot Products.** Suppose that $\vec{v}, \vec{u}$, and $\vec{w}$ make three edges of a triangle. Show that whenever the sides satisfy

$$|\vec{v}|^2 = |\vec{u}|^2 + |\vec{w}|^2.$$

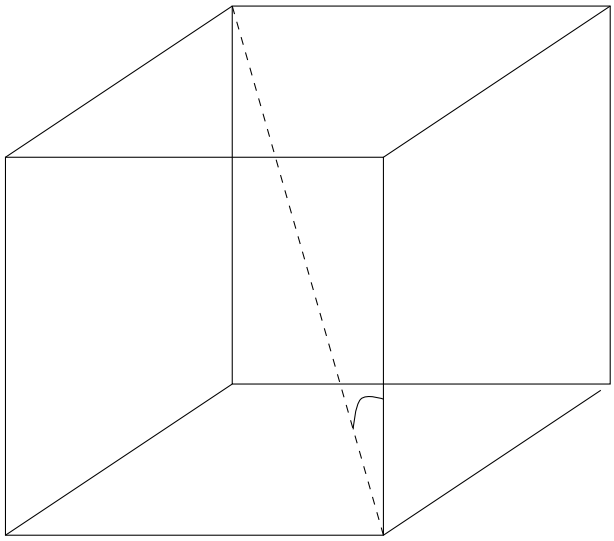
that $\vec{u} \cdot \vec{w} = 0$, and the triangle must be a right triangle.

0.2. **Component of vectors.** Find a unit vector that points in the same direction as

$$\langle 1, 3, 1 \rangle.$$

Then find the component of the vector $\langle 2, 1, 1 \rangle$ onto this new vector.

0.3. **Angles.** Find the angle between the diagonal of a cube and its edges.



0.4. **Angles II.** Prove the identity

$$\cos(\theta_1 + \theta_2) = \cos(\theta_1)\cos(\theta_2) - \sin(\theta_1)\sin(\theta_2)$$

by using the dot product formula for angles and the following setup of vectors.