NAME:

0.1. **Lengths.** Find a unit vector pointing in the direction of $\langle 1, 1, 2 \rangle$.

0.2. **Dot Product.** Find a unit vector $\hat{u}$ whose component onto the vector $\vec{v} = \langle 1, 0 \rangle$ is

$$\text{comp}_{\vec{v}}(\hat{u}) = \frac{1}{2}.$$

0.3. **Some Geometry.** Suppose that $\vec{u}, \vec{v}$ and $\vec{w}$ are vectors corresponding to the edges of an equiliateral triangle, so that
$$|\vec{u}| = |\vec{v}| = |\vec{w}|.$$
Show that the angle between $\vec{v}$ and $\vec{u}$ is $\frac{\pi}{3}$ radians.

0.4. **Bonus Problem, worth no points.** This problem is taken from *The Curious Incident of the Dog in the Night-time,* and can be proven using the vector geometry we've developed in class.

Prove the following result: A triangle with sides that can be written in the form $n^2 + 1$,$n^2 - 1$ and $2n$ (where $n > 1$) is right-angled.

Show, by means of a counterexample, that the converse is false.