Quiz 1 Name: _____

Throughout, let $\mathbf{u} = \langle 2, 3, 1\rangle$, $\mathbf{v} = \langle -1, -1, -2\rangle$, and $\mathbf{w} = \langle 0, 1, 1\rangle$.

1. Find the position vector $\mathbf{a}$ (i.e. the vector $\mathbf{a}$ with initial point at the origin) with representation given by the directed line segment $\overrightarrow{AB}$ between the points $A(0, 3, 1)$ and $B(2, 3, -1)$.

2. Determine whether each of the following exists. If it *does* exist, compute it (writing vectors with respect to $\mathbf{i}$, $\mathbf{j}$, and $\mathbf{k}$); if not, state why.

   (a) $\mathbf{u} + \mathbf{w}$

   (b) $|\mathbf{v}| + \mathbf{w}$

   (c) $(\mathbf{u} + \mathbf{w}) \cdot (\mathbf{u} + \mathbf{w})$

   (d) $\text{proj}_{\mathbf{u}} \mathbf{v}$

   (e) The unit vector in the same direction as $(\mathbf{u} \cdot \mathbf{v})\,\mathbf{w}$.

   (f) $\mathbf{v} + \langle -3, \frac{1}{2}\rangle$

   (g) The angle between $\mathbf{v}$ and the z-axis. **Hint**: Any position vector in the direction of the z-axis may be used.

3. Draw a rectangular box with the origin and the point $P(1, 2, 3)$ as opposite vertices and with its faces parallel to the coordinate planes. Label all vertices of the box. **Note**: The arrowheads are pointing towards the *positive* values on each axis!