

### Quiz 3

$$\vec{u} = \langle 2, -1, 1 \rangle, \quad \vec{v} = \langle 2, 4, 2 \rangle$$

$$(a) \quad \vec{u} \cdot \vec{v} = 4 - 4 + 2 = 2$$

$$(b) \quad \cos \theta = \frac{\vec{u} \cdot \vec{v}}{|\vec{u}| |\vec{v}|} = \frac{2}{\sqrt{6} \sqrt{24}} = \frac{2}{\sqrt{144}} = \frac{2}{12} = \frac{1}{6}$$

$$(c) \quad \vec{u} \cdot \langle 1, -1, 1 \rangle = 2 + 1 + 1 = 4 \neq 0,$$

so  $\vec{u}$  not perpendicular

$$\vec{v} \cdot \langle 1, -1, 1 \rangle = 2 - 4 + 2 = 0, \text{ so}$$

$\vec{v}$  is perpendicular.

$$(d) \quad \text{Proj}_{\vec{v}} \vec{u} = \frac{\vec{u} \cdot \vec{v}}{|\vec{v}|^2} \vec{v} = \frac{2}{24} \langle 2, 4, 2 \rangle =$$

$$\frac{1}{12} \langle 2, 4, 2 \rangle = \left\langle \frac{1}{6}, \frac{1}{3}, \frac{1}{6} \right\rangle$$