

$$71 \# 2) \quad 3x^2 + 3y^2 + 3z^2 + 2y - 2z = 9$$

$$x^2 + y^2 + z^2 + \frac{2}{3}y - \frac{2}{3}z = 3$$

$$x^2 + y^2 + \frac{2}{3}y + \frac{1}{9} + z^2 - \frac{2}{3}z + \frac{1}{9} = 3 + \frac{1}{9} + \frac{1}{9}$$

$$b = \frac{2}{3}$$

$$\frac{b}{2} = \frac{1}{3}$$

$$\left(\frac{b}{2}\right)^2 = \frac{1}{9}$$

$$b = -\frac{2}{3}$$

$$\left(\frac{b}{2}\right)^2 = \frac{1}{9}$$

$$\left(\frac{b}{2}\right)^2 = \frac{1}{9}$$

$$x^2 + \left(y + \frac{1}{3}\right)^2 + \left(z - \frac{1}{3}\right)^2 = \frac{27}{9} + \frac{2}{9} = \frac{29}{9}$$

center : $\left(0, -\frac{1}{3}, \frac{1}{3}\right)$
 rad : $\frac{\sqrt{29}}{3}$

$$72 \# 1) \quad \vec{x} = 2\langle 3, -2 \rangle + \langle -2, 5 \rangle = \langle 6, -4 \rangle + \langle -2, 5 \rangle = \langle 4, 1 \rangle$$

$$\vec{u}_x = \frac{\vec{x}}{|\vec{x}|} = \frac{\langle 4, 1 \rangle}{\sqrt{4^2 + 1^2}} = \frac{\langle 4, 1 \rangle}{\sqrt{17}}$$

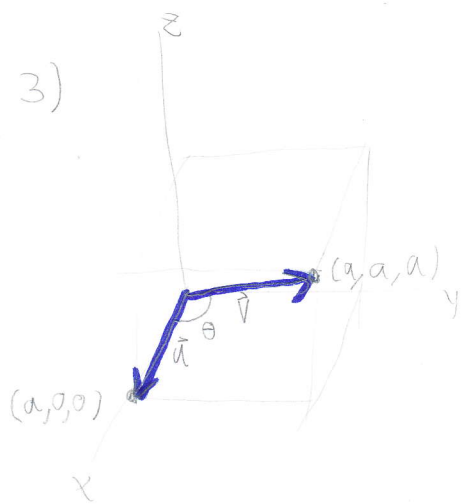
$$73 \# 1 d) \quad \vec{a} = \langle 0, 5, -3 \rangle \quad \vec{b} = \hat{i} + \hat{j} + \hat{k} = \langle 1, 1, 1 \rangle$$

$$\text{proj}_{\vec{a}} \vec{b} = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}|^2} \vec{a} = \frac{2}{34} \langle 0, 5, -3 \rangle = \frac{1}{17} \langle 0, 5, -3 \rangle$$

$$\vec{a} \cdot \vec{b} = 0 \cdot 1 + 5 \cdot 1 + -3 \cdot 1 = 2$$

$$|\vec{a}| = \sqrt{0^2 + 5^2 + (-3)^2} = \sqrt{34}$$

73 # 3)



$$\vec{u} = \langle a, 0, 0 \rangle$$

$$\vec{v} = \langle a, a, a \rangle$$

$$\vec{u} \cdot \vec{v} = |\vec{u}| |\vec{v}| \cos \theta$$

$$\vec{u} \cdot \vec{v} = a^2 + 0 + 0 = a^2$$

$$|\vec{u}| = \sqrt{a^2 + 0^2 + 0^2} = a$$

$$|\vec{v}| = \sqrt{a^2 + a^2 + a^2} = \sqrt{3a^2} = \sqrt{3}a$$

$$\theta = \arccos \left(\frac{\vec{u} \cdot \vec{v}}{|\vec{u}| |\vec{v}|} \right) = \arccos \left(\frac{a^2}{\sqrt{3} a^2} \right)$$

$$= \arccos \left(\frac{1}{\sqrt{3}} \right)$$