Name: Solution Key **Panther ID:** _____

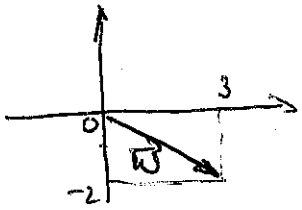
Quiz 08/28 MAC-2313 Fall 2018

Fill in the answer for each of the following. (2 pts each)

(a) Write the equation of the sphere with center at $(0, 0, 1)$ and of radius 2.

$$x^2 + y^2 + (z-1)^2 = 2^2$$

(b) Sketch (in 2-space) the vector $\mathbf{w} = 3\mathbf{i} - 2\mathbf{j}$ with the initial point at the origin and compute $\|\mathbf{w}\|$.



(c) If $\mathbf{u} = \mathbf{i} - \mathbf{j}$ and $\mathbf{v} = \mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$ are vectors in 3-space, compute the dot product $\mathbf{u} \cdot \mathbf{v}$.

$$\vec{u} \cdot \vec{v} = 1 \cdot 1 + (-1) \cdot (-2) + 0 \cdot 2 = \boxed{3}$$

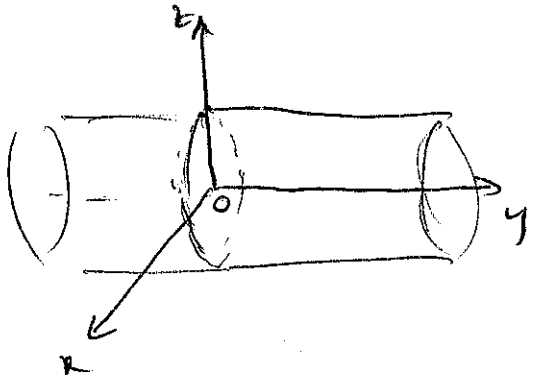
(d) If $\mathbf{u} = \mathbf{i} - \mathbf{j}$ and $\mathbf{v} = \mathbf{i} - 2\mathbf{j} + 2\mathbf{k}$, find the angle θ between $\mathbf{u}$ and $\mathbf{v}$.

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

$$3 = \sqrt{2} \cdot \sqrt{1+4+4} \cos\theta$$

$$3 = \sqrt{2} \cdot 3 \cos\theta \implies \cos\theta = \frac{1}{\sqrt{2}} \implies \underline{\theta = \frac{\pi}{4}}$$

(e) Sketch the surface $x^2 + z^2 = 1$ in 3-space and describe in words what it is.



circular cylinder along the y-axis