

Name: Key

I.D.# _____

Serial # _____

Q1: Find the area inside the polar curve $r = 1 + \cos\theta$ and outside the curve

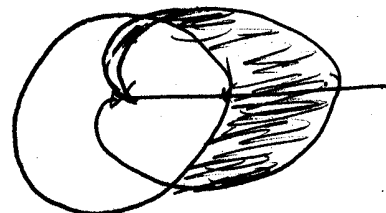
$$r = 1.$$

$$\cos\theta = 0 \Rightarrow \theta = \frac{\pi}{2}$$

$$A = 2 \cdot \frac{1}{2} \int_0^{\pi/2} [(1 + \cos\theta)^2 - 1^2] d\theta$$

$$= \int_0^{\pi/2} [1 + 2\cos\theta + \cos^2\theta - 1] d\theta = \int_0^{\pi/2} [2\cos\theta + \frac{1}{2} + \frac{1}{2}\cos 2\theta] d\theta$$

$$= [2\sin\theta + \frac{\theta}{2} + \frac{1}{4}\sin 2\theta]_0^{\pi/2} = 2 + \frac{\pi}{4}$$



Q2: Find equation of the sphere that is centered at $(-3, 2, 1)$, and tangent to the xy -plane. $r = |z| = 1$

$$(x + 3)^2 + (y - 2)^2 + (z - 1)^2 = 1$$

Q3: Find the magnitude of $\mathbf{u} + \mathbf{v}$ and $\mathbf{u} - \mathbf{v}$, where $\mathbf{u} = \langle -2, 0, 3 \rangle$ and $\mathbf{v} = \langle 2, -1, 1 \rangle$.

$$\vec{u} + \vec{v} = \langle 0, -1, 4 \rangle,$$

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

$$\|\vec{u} + \vec{v}\| = \sqrt{0 + 1 + 16} = \sqrt{17}$$

$$\|\vec{u} - \vec{v}\| = \sqrt{16 + 1 + 4} = \sqrt{21}$$