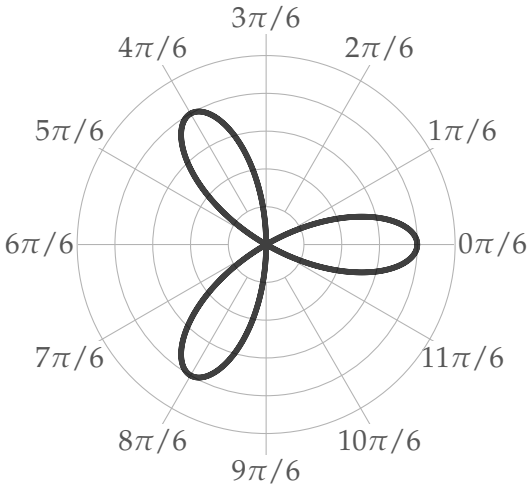
# Math 241 Quiz 3

Names: _____

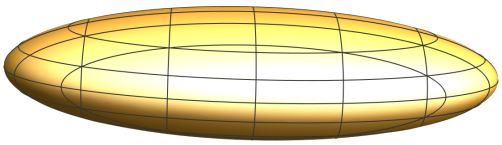
**1.** Let $R$ be the region in enclosed by the rightmost petal of the polar graph of $r = \cos 3\vartheta$. Write integrals that give the center of mass of $R$.




**2.** Write integrals that give the volume of the solid bounded by $z = 0$, the plane containing the points $(1, 1, 0)$, $(-1, 0, 2)$, and $(0, -1, 3)$, and the cylinder $x^2 + y^2 = 1$.

**3.** The radius of Earth (assuming a sphere) is $6371$ kilometers. the atmosphere at distance $\rho$ from the center of Earth has a density of approximately $p_0 e^{-c\rho}$ kilograms per cubic meter for some constants $p_0, c$. Write a triple integral that gives the total mass of Earth's atmosphere.

**4.** Find the volume of the ellipsoid $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} + \dfrac{z^2}{c^2} \leq 1$.



**5 (Bonus! Do on a separate page if all others are perfect!).** Find the volume of the part of the unit sphere above the plane $z = 1/2$.