Applications of Multiple Integrals- HW Problems

1. Find the average value of the function $f(x,y) = e^{-(x^2+y^2)}$ over the region where $4 \leq x^2 + y^2 \leq 9$ and $x \leq 0$.

2. Find the center of mass of a uniformly dense region in $\mathbb{R}^2$ bounded by $y = \sqrt{4 - x^2}$, $y = 0$, and $x = 0$, with $x \geq 0$.

3. Find the mass of a solid bounded by the cylinder $x^2 + y^2 = 4$ and the cone $z^2 = x^2 + y^2$ if the density is given by $\delta(x,y,z) = \sqrt{x^2 + y^2}$.

4. Set up the integrals with endpoints, but do not evaluate, that represent the center of mass coordinates of a solid region bounded by $x^2 + y^2 + z^2 = 1$ and $x^2 + y^2 + z^2 = 4$, with $z \geq 0$ and $\delta(x,y,z) = x^2 + y^2 + z^2$.

5. Find the moment of inertia about the z axis of a ball given by $x^2 + y^2 + z^2 \leq 4$ if the density is constant.