Quiz #8 for Calculus 3 (MATH-UA.0123-001)

Problem 1. A solid E lies within the cylinder $x^2 + y^2 = 4$, below the plane $z = 4$, and above the paraboloid $4 - x^2 - y^2$. The density (units: kg/m^3) at any point is equal to C times the distance to the z axis. Find the mass of E (in kg). [*5 points*]

Problem 2. Evaluate $\iiint_E (x^2 + y^2)dV$, where E is the region bounded by the spheres $x^2 + y^2 + z^2 = 4$ and $x^2 + y^2 + z^2 = 9$. Hint: $\sin(\phi)^3 = \frac{1}{4}(3\sin(\phi) - \sin(3\phi))$. [*5 points*]