

Name: _____

EMPLID: _____

1. (5 points) Find the volume of the solid region under the sphere of radius 5 centered at the origin and above the plane $z = 3$.

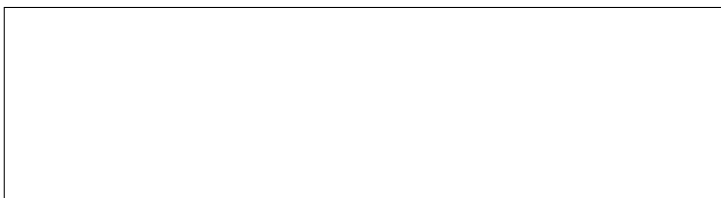


2. (5 points) Find the mass and the x -component of the center of mass of the solid E bounded by the parabolic cylinder $z = 1 - y^2$ and the planes $x + z = 1$, $x = 0$, and $z = 0$ with $\rho(x, y, z) = 4$.



3. (5 points) Express the integral $\iiint_E f(x, y, z) dV$ as an iterated integral in six different ways, where E is the solid bounded by the surfaces $y = 4 - x^2 - 4z^2$, $y = 0$.

4. (5 points) Evaluate $\iiint_E (x^2 + y^2) dV$ where E is the solid lying between the spheres $x^2 + y^2 + z^2 = 4$ and $x^2 + y^2 + z^2 = 9$.



5. (5 points) Sketch the solid whose volume is $\int_0^6 \int_0^{2\pi} \int_0^r r dz d\theta dr$ in cylindrical coordinates and find its volume.



6. (5 points) Sketch the plane curve $\vec{r}(t) = e^{2t}\hat{i} - e^t\hat{j}$ together with the position vector $\vec{r}(0)$ and the tangent vector $\vec{r}'(0)$.



7. (5 points) Find parametric equations for the tangent line to the curve $x = t^2 + 1, y = 8\sqrt{t}, z = e^{t^2=t}$ at the point $(2, 8, 1)$.



8. (5 points) Sketch the curve $\vec{r}(t) = 9\hat{i} + 4t^2\hat{j} + 3t^3\hat{k}, 0 \leq t \leq 1$ and find its length.



9. (5 points) Find the volume of the solid that lies both with the sphere $x^2 + y^2 + z^2 = 4$ and the cylinder $x^2 + z^2 = 1$.



10. (5 points) Sketch the vector field $\vec{F}(x, y) = \langle x, -y \rangle$.