

1. Let $\tilde{\mathbf{F}} = 5x \hat{\mathbf{x}} + 5y \hat{\mathbf{y}} + 5z \hat{\mathbf{z}}$ and let Σ be the solid bounded by $z = 7 - x^2 - y^2$ and the xy -plane.
 - Write down inequalities that define Σ using your choice of coordinates.
 - Construct a triple integral that gives the volume of Σ .
 - Compute the divergence of $\tilde{\mathbf{F}}$.
 - Evaluate $\iiint_{\Sigma} \nabla \cdot \tilde{\mathbf{F}} dV$.
 - What is the closed surface that forms the boundary of Σ ?
 - Write down a surface integral equivalent to the triple integral above.
2. Let S consist of the sphere of radius 5 centered at the origin above the xy -plane and the disk of radius 5 in the xy -plane that forms a closed surface with the hemisphere. Let $\tilde{\mathbf{H}} = -2r \hat{\mathbf{r}}$ in spherical coordinates.
 - Evaluate $\iiint_{\Sigma} \nabla \cdot \tilde{\mathbf{H}} dV$.
 - Directly compute the flux of $\tilde{\mathbf{H}}$ through S and compare.