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.