Math 211 Stokes' Theorem and Divergence Theorem Practice

1. Verify Stokes' Theorem for the vector field $\mathbf{F}(x, y, z) = x^2\mathbf{i} + y^2\mathbf{j} + z^2\mathbf{k}$, where *S* is the part of the paraboloid $z = 1 - x^2 - y^2$ that lies above the *xy*-plane and has upward orientation. That is, calculate both the line integral of **F** around the boundary of *S* and the surface integral of curl **F** on *S*.

2. Verify the Divergence Theorem for the vector field $\mathbf{F}(x, y, z) = x\,\mathbf{i} + y\,\mathbf{j} + z\,\mathbf{k}$, where *S* is the unit sphere $x^2 + y^2 + z^2 = 1$. That is, calculate both the surface integral of **F** on *S* and the triple integral of div **F** over the interior of *S*.