Name:

Stokes's Theorem: If C is the boundary of a 'nice' region $\mathcal{S}$,

$$\iint_S (\nabla \times \mathbf{F}) \cdot \mathbf{n}\, dS = \int_C \mathbf{F} \cdot d\mathbf{r}$$

so long as the normal $\mathbf{n}$ and the orientation of C are compatible.

In the two problems below you will set up, but **not evaluate** the integrals on both side of this equation where $\mathcal{S}$ is the hemisphere $x^2 + y^2 + z^2 = 1$ with $y \geq 0$ and where

$$\mathbf{F} = \langle y, z, -x \rangle .$$

The hemisphere is given the orientation with unit normal pointing **towards the origin**.

1. Write down an integral expressing $\int_C \mathbf{F} \cdot d\mathbf{r}$. Your answer should be of the form $\int_a^b g(t)\, dt$ where a and b are numbers and where $g(t)$ is an explicit function. Please do not compute the integral. Please be careful about orientation/sign.

Recall: $\mathcal{S}$ is the hemisphere $x^2 + y^2 + z^2 = 1$ with $y \geq 0$ and unit normal pointing towards the origin and

$$\mathbf{F} = \langle y, z, -x \rangle .$$

2. Write down an integral expressing $\iint_{\mathcal{S}} (\nabla \times \mathbf{F}) \cdot \mathbf{n} \; dS$. Your answer should be in the form of an iterated integral of an explicit integrand that is a function of two parameter variables. Please do **not** compute the integral.