

Name: _____

Math 2030, Winter 2017, Quiz 13
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No calculators needed or allowed.

Let \mathcal{S} be the surface $\mathbf{r}(x, y) = (x, y, x^2 + y^2)$ over the disk $x^2 + y^2 \leq 1$.
Let $\mathbf{F}(x, y, z) = (y, 0, z)$.

1. Compute $\mathbf{n} \, dS = \frac{\partial \mathbf{r}}{\partial x} \times \frac{\partial \mathbf{r}}{\partial y} \, dA$.

2. Compute $\nabla \times \mathbf{F}$.

3. Compute $\iint_{\mathcal{S}} \nabla \times \mathbf{F} \cdot \mathbf{n} \, dS$.

Let $\mathbf{r}(\theta) = (\cos(\theta), \sin(\theta), 1)$, $0 \leq \theta \leq 2\pi$, be the boundary, $\partial\mathcal{S}$.

4. Compute $\vec{T} \, ds = d\mathbf{r} = \frac{d\mathbf{r}}{d\theta} \, d\theta$.

5. Compute $\int_{\partial\mathcal{S}} \mathbf{F} \cdot \vec{T} \, ds$.