Math 2270 Quiz 6

Name _____

Points will be deducted for untidy or disorganized answers

1. (5 points) Let $\mathbf{F} = \langle y, -x, z \rangle$ be a vector field and S be the boundary surface of the solid region in space bounded above by the paraboloid $z = 4 - x^2 - y^2$, below by $z = 0$, and on the sides by the cylinder $x^2 + y^2 = 1$.

   Use the *Divergence Theorem* to find the outward flux of $\mathbf{F}$ across the entire surface S, namely
   $$\iint_S \mathbf{F} \cdot \mathbf{n} \, d\sigma$$

2. (5 points) Let $\mathbf{F} = \langle 0, x, 0 \rangle$ and C denote the curve formed by the intersection of the surfaces $x^2 + y^2 = 1$ and $z = xy$.

   Use *Stokes' Theorem* to find the counterclockwise circulation (as viewed from above) of $\mathbf{F}$ around C, namely
   $$\oint_C \mathbf{F} \cdot d\mathbf{r}$$