$$\vec{\mathbf{F}} = \langle -y,\ x,\ 0 \rangle$$

Let C_1 be the path from $(1,\ 0,\ 0)$ to $(-1,\ 0,\ 0)$ formed by the intersection of the cylinder $x^2 + y^2 = 1$ and the plane $z = y$.

Calculate the line integral $\displaystyle\int_{C_1} \vec{\mathbf{F}} \bullet d\vec{\mathbf{r}}$