curl $\mathbf{F} = (xe^{\ y} \quad 6x)\,\mathbf{i} \quad (ye^{\ y} \quad y)\,\mathbf{j} + (6z \quad z)\,\mathbf{k}$ a d we take S to be the disk $x \ + y \ \le 4$, $z = 2$. Si ce is orie ted cou terclockwise (from above), we orie t S upward.

The $\quad = \mathbf{k}$ a d curl $\mathbf{F} \cdot \quad = 6z \quad z$ o S , where $z = 2$. Thus

$$\mathbf{F} \cdot d\mathbf{r} = \iint_S \text{curl}\,\mathbf{F} \cdot \quad dS = \iint_S (6z \quad z)\ dS = \iint_S (12 \quad 2)\,dS$$

$$= 10(\text{area of } S) = 10(\pi \cdot 2\ \ ) = 40\pi.$$