11. $F(x,y) = x^2 y\,\vec{i} + y\,\vec{j}$ C

$\vec{r}(t) = \underbrace{(2\cos t)}_{x(t)}\vec{i} + \underbrace{(2\sin t)}_{y(t)}\vec{j} \quad 0 \le t \le \frac{\pi}{2}$

$F(x(t), y(t)) = (2\cos t)^2 (2\sin t)\,\vec{i} + 2\sin t\,\vec{j}$

$r'(t) = -2\sin t\,\vec{i} + 2\cos t\,\vec{j}$

$F(x(t), y(t), z(t)) \cdot r'(t) = 4\cos^2 t\,(-4)\sin^2 t + 4\sin t\cos t$

$= -16\cos^2 t \sin^2 t + 4\sin t\cos t$

$$\int_0^{\frac{\pi}{2}} \left(-16\cos^2 t \sin^2 t + 4\sin t\cos t\right) dt$$

$= \boxed{-1.1416}$