Exercise. *Let C be the curve in $\mathbf{R}^2$ given by $\psi(t) = (t\cos t, t\sin t)$, where $0 \le t \le 2$. Let $\nu = -ydx + xdy$. Compute $\int_C \nu$ (with the induced orientation).*

Solve.

$$\int_C \nu = \int_{[1,2]} \nu(\frac{\partial \psi}{\partial t})dt$$

$$= \int_{[1,2]} \nu(\cos t - t\sin t, \sin t + t\cos t)dt$$

$$= \int_{[1,2]} -(\sin t + t\cos t)(\cos t - t\sin t) + (\cos t - t\sin t)(\sin t + t\cos t)dt$$

$$= 0.$$

$\square$