

For each vector field $F(x, y)$ and path \mathcal{C} , do the following:

(a) Plot $F(x, y)$ and \mathcal{C} on the same set of axes

(b) Is $\int_{\mathcal{C}} F(x, y) \cdot dr$ positive or negative?

(c) Calculate $\int_{\mathcal{C}} F(x, y) \cdot dr$

1. $F(x, y) = \langle y - 3, x + 2y \rangle$

\mathcal{C} is the portion of the polar rose $r = 2 \cos(2\theta)$ with $0 \leq \theta \leq \frac{\pi}{2}$

2. $F(x, y)$ is the same as in #1,

\mathcal{C} is the portion of the polar rose $r = 2 \cos(2\theta)$ with $0 \leq \theta \leq 2\pi$

3. $F(x, y) = \langle 3y - x^2y, 4x + 3 \rangle$

\mathcal{C} is the line segment from $(0, 2)$ to $(2, 0)$