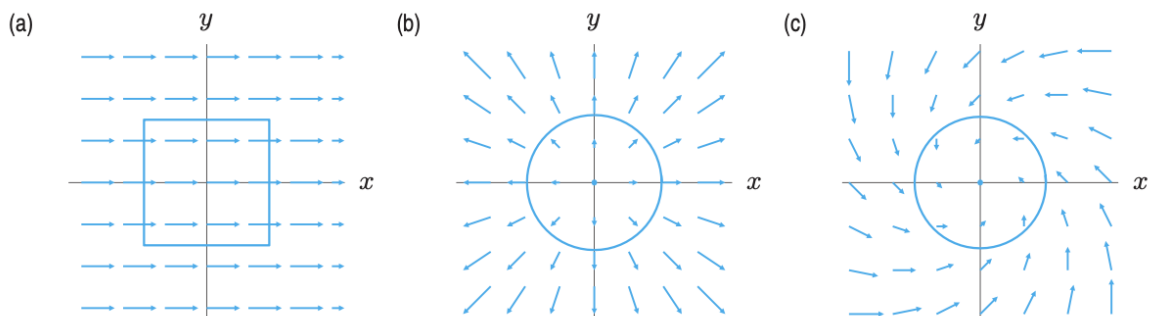# Math 203 — Flux integrals

---

Problem 1. Each image below shows a vector $\mathbf{F}$ along with a closed curve C that we should assume is positively oriented. Determine the sign (positive, negative, or zero) of $\oint_C \mathbf{F} \cdot \mathbf{n}\, ds$ in each case.

(a)

(b)

(c)

Problem 2. Let $\mathbf{F}(x,y) = \langle x - y, x + y \rangle$. Let C_1 be the parabola $y = x^2$ from $(0,0)$ to $(2,4)$, let C_2 be the line segment from $(2,4)$ to $(0,0)$, and let $C = C_1 + C_2$. Sketch $\mathbf{F}$ in CalcPlot3d to estimate whether the flux integral $\oint_C \mathbf{F} \cdot \mathbf{n}\, ds$ is positive, negative, or zero and then compute it.

Problem 3. Let $\mathbf{F}(x,y) = \langle -y, x \rangle$ and let C be the unit circle oriented counter-clockwise. Sketch $\mathbf{F}$ in CalcPlot3d to estimate whether the flux integral $\oint_C \mathbf{F} \cdot \mathbf{n}\, ds$ is positive, negative, or zero and then compute it.