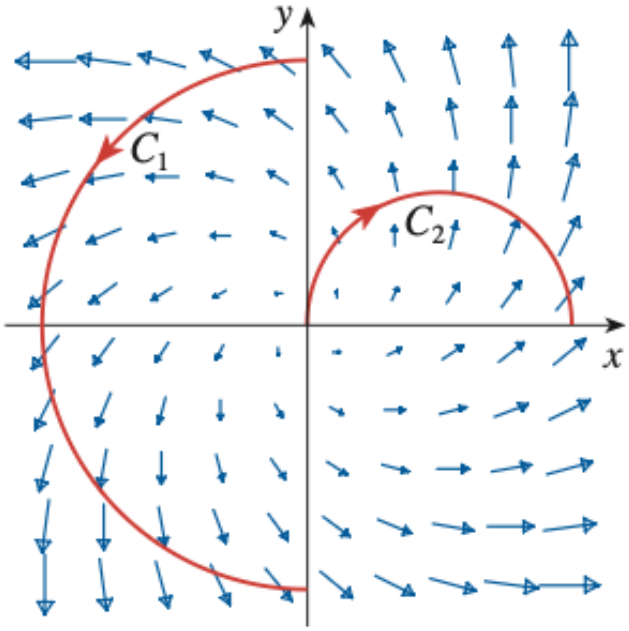
# Calculus III (Math 241)

## Problems

**1.** The figure below shows a vector field $\mathbf{F}$ and two curves $C_1$ and $C_2$. Determine whether the line integrals of $\mathbf{F}$ over $C_1$ and $C_2$ are positive, negative, or zero. Explain your reasoning.




**2.** Let

$$F(x) = \int_0^1 \frac{e^{xt}}{1+t}\,dt, \qquad x \in \mathbb{R}.$$

(a) Show that $F$ is differentiable.

(b) Show that $F$ satisfies the differential equation

$$y' + y = \frac{e^x - 1}{x} \quad \text{on } \mathbb{R} \setminus \{0\}.$$