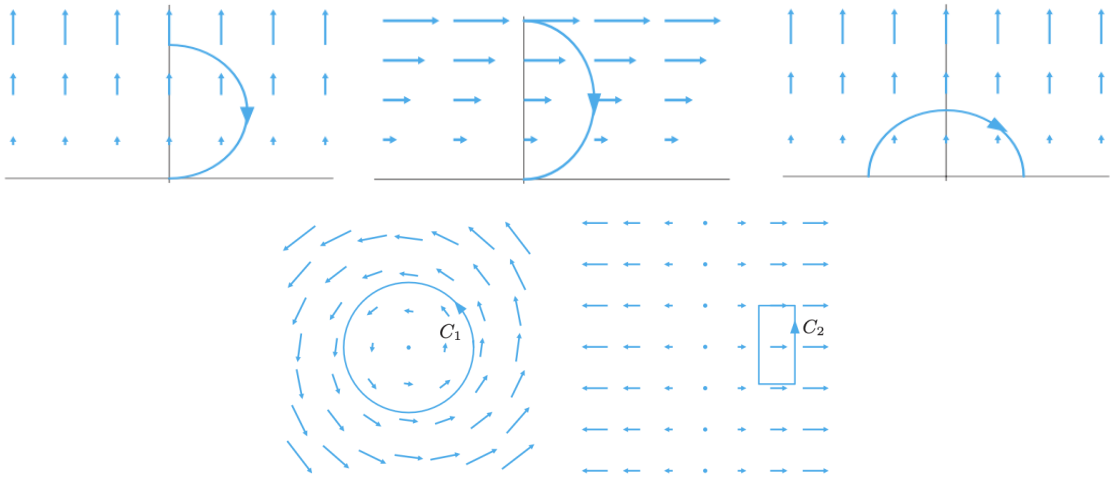
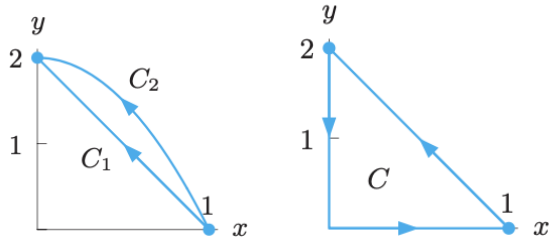
Math 203 — Line integrals of vector fields

Problem 1. Consider the vector fields $\mathbf{F}$ and oriented curves C shown below. Determine the sign (positive, negative, or zero) of $\int_C \mathbf{F} \cdot d\mathbf{r}$.



Problem 2. Let $\mathbf{F}(x, y) = \langle x, y \rangle$. For each figure below, let C be the piecewise-defined closed curve that is oriented in a counter-clockwise fashion. Set up and compute $\oint_C \mathbf{F} \cdot d\mathbf{r}$. Before doing your calculations, use CalcPlot3d to make a plot of $\mathbf{F}$ and make a conjecture about the sign of the line integral. *Note: C_2 is part of the parabola $y = 2 - 2x^2$.*



Problem 3. Let $\mathbf{F}(x, y) = \langle -y, x \rangle$. Let C be the piecewise-defined closed curve that is oriented in a counter-clockwise fashion as shown below. Set up and compute $\oint_C \mathbf{F} \cdot d\mathbf{r}$. Before doing your calculation, use CalcPlot3d to make a plot of $\mathbf{F}$ and make a conjecture about the sign of the line integral.