

Lab 6: Vector Fields

Subhadip Chowdhury

In this lab, we'll explore the line integrals of four different vector fields along different curves. Look in the Labs section of our course site on Blackboard for the *Mathematica* notebook **Lab6.1800.nb** and save it to your desktop. Then open the notebook and click the "Start" button to initialize the commands.

Vector Field	Yes or Maybe or No			
	Circulation Free	Path Independent	Gradient Field	Irrotational
F ₁				
F ₂				
F ₃				
F ₄				

Question 1:

From this experiment, do you know for certain that any of the fields are path independent? Conversely, do you know for certain that any of the fields are *not* path independent? Explain.

Question 2:

Conjecture a geometric property of a closed curve C that will guarantee that the line integral of F_3 along C equals zero. (Hint: Make sure to consider some closed curves that enclose the origin and some that do not.)

Question 3:

What can you conclude from your data about the relationship between circulation free/path independent vector fields and irrotational vector fields?