

# Multivariable Calculus

## MATH 53

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UC Berkeley

August 24, 2023



Course website:

[https://math.berkeley.edu/~zworski/syllabus53\\_23.html](https://math.berkeley.edu/~zworski/syllabus53_23.html)

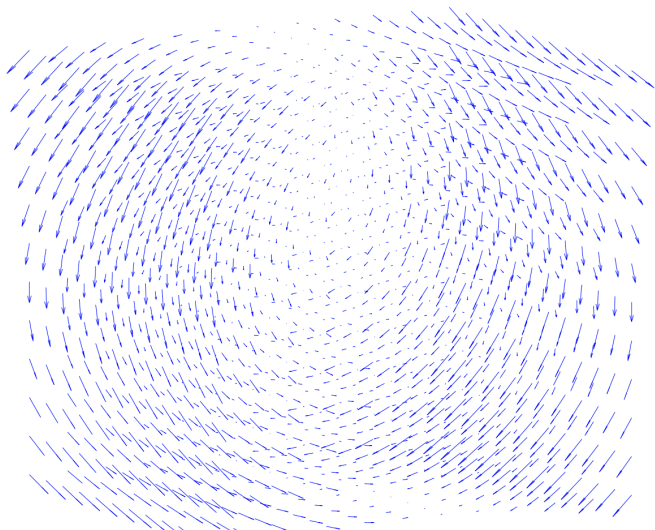
bCourse website:

<https://bcourses.berkeley.edu/courses/1526120>

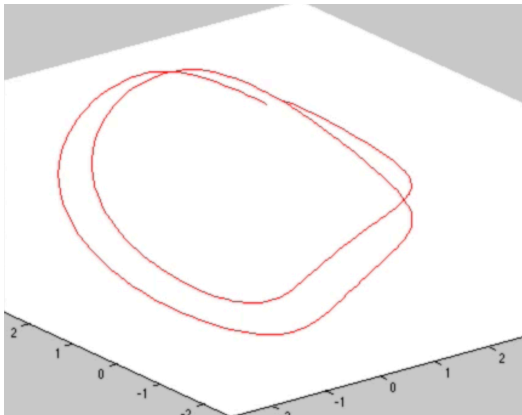
An example:

Assign to each point in three space  $(x, y, z)$  a **vector**:

$$(y, -x + yz, (1 - y^2))$$

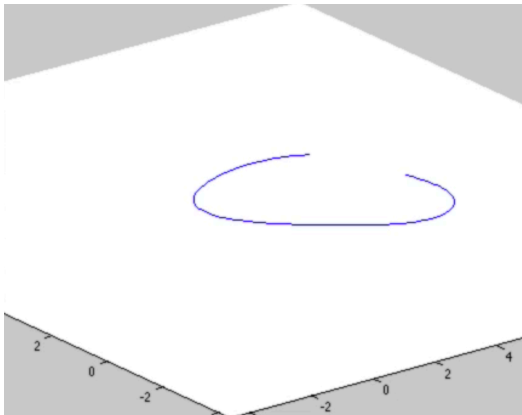


Going with the flow:



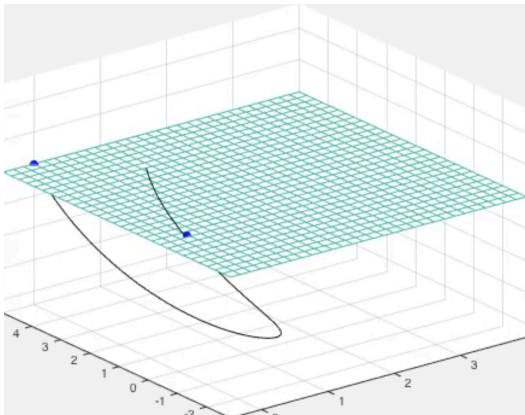
A “regular” trajectory

Going with the flow:

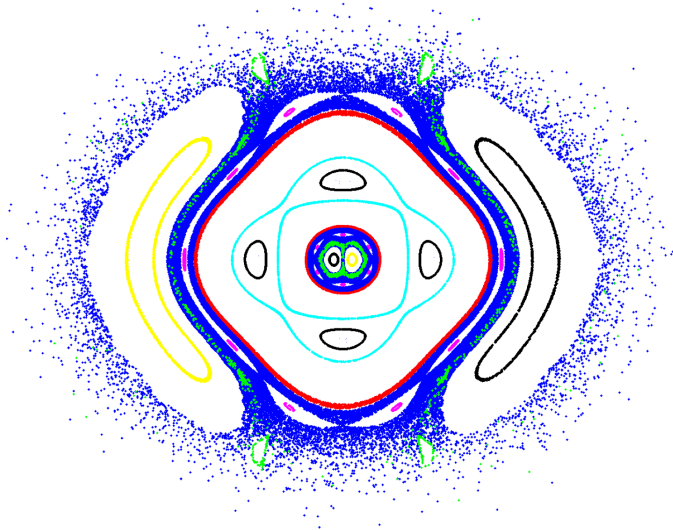


A “chaotic trajectory”

How to visualise this?



Chaos:



Math 53 will (**hopefully**) be less chaotic

## Outline of the course

- ▶ Parametric equations (how to draw curves)
- ▶ Vectors and Planes
- ▶ Partial Derivatives
- ▶ Multiple Integrals
- ▶ Vector Calculus
- ▶ Maxwell Equations

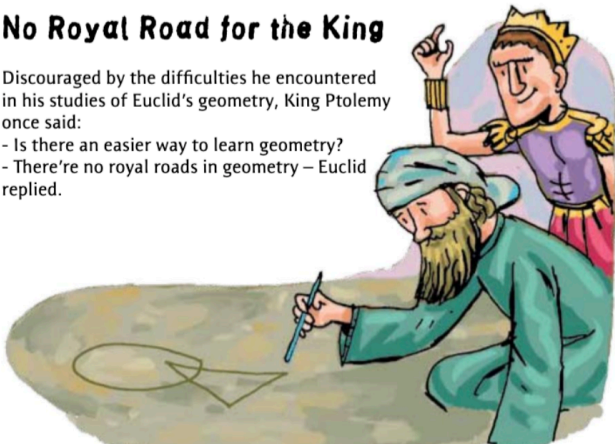


Finally, some **bad news...**

### **No Royal Road for the King**

Discouraged by the difficulties he encountered in his studies of Euclid's geometry, King Ptolemy once said:

- Is there an easier way to learn geometry?
- There're no royal roads in geometry – Euclid replied.



Sadly, same for **Multivariable Calculus...**