

Today's agenda

- "Setting the Stage" Icebreaker/Reflection Activity
- Tour of the course:
 - Syllabus
 - Canvas
 - Active Calculus Textbook
 - Webpage
 - Gradescope
 - Zulip
 - Edfinity
- Start learning calculus!

Motivating Questions

Q: What is multivariable calculus?

The study of function of more than one variable.

Q: Why should we study it?

- Multivariable functions arise naturally, in many contexts.
 - natural / social science
 - finance
 - statistics
 - economics
 - engineering, more!

Q: How do we study multivariable functions, using calculus?

In particular, by:

- graphing
- computing limits
- differentiating
- integrating
- lots more!

Q: What will I be able to do at the end of the course?

- Apply differentiation and integration to
 - approximate function
 - solve optimization problems
 - compute volumes / surface areas / center of mass / more.

Preview Activity 9.1.1

- Read section 9.1 up to Activity 9.1.1. (2 min)
- Complete 9.1.1 and discuss w/ your group. (5 min)
- Class discussion.

Section 9.1.1 Functions of Several Variables

Definition 9.1.3 A function f of two independent variables is a rule that assigns to each pair (x, y) of real numbers in some set D a unique real number $f(x, y)$. \square

Examples: • $A = A(P, t)$ from 9.1.1.

• $f(x, y) = x^2 + y^2$

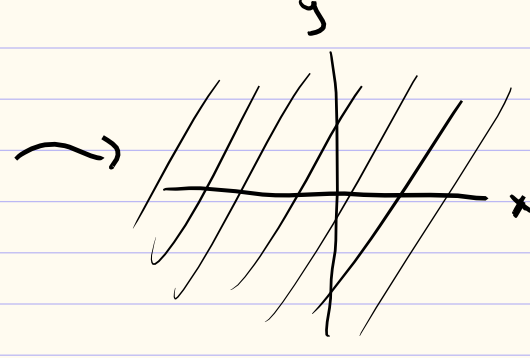
Definition 9.1.4 The domain of a function f is the set of all inputs for which the function is defined.

Activity 9.1.2

- Complete 9.1.2 and discuss w/ your group. (5 min)
- Class discussion.

a. $f(x, y) = x^2 + y^2$

$D = \{(x, y) : x, y \in \mathbb{R}\}$

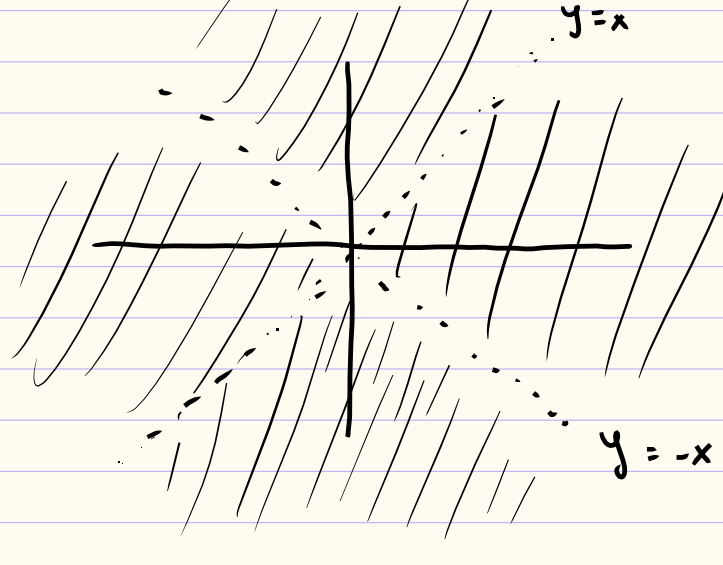


b. $f(x, y) = \sqrt{x^2 + y^2}$

$x^2 + y^2 \geq 0 \Rightarrow D = \{(x, y) : x, y \in \mathbb{R}\}$

c. $f(x, y) = \frac{x+y}{x^2-y^2}$

$D = \{(x, y) : y \neq x \text{ and } y \neq -x\}$



d. Need: $1 - xy^2 \geq 0$

$1 - xy^2 \neq 0$

$\Rightarrow xy^2 < 1$

Graph

via

Desmos!

