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Visualization and Plotting of Complex Valued Functions

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Problem Background:

Although calculators that can plot complex valued functions exist, and free web-based calculator apps also exist, there isn't a free service for graphing complex valued functions online.

This tool could be incredibly useful for complex analysis students who don't wish to go out of their way to download software or pay for a subscription, or for people interested in the subject but not dedicated enough to go through the same hurdles.

Target:

- Improve on existing plotting tools to have the capability to plot complex valued functions.
- Make the process of plotting these functions accessible to someone as early as a high school junior.
- Create a tool that does not require a login or payments.

Causes:

Problem: Plotting complex valued functions is inaccessible.
Why: Web based graphing tools generally only support up to 3 axes, and don't support operations over the complex set
Why: To support more than 3 axes it's necessary to represent at least one part of the output using a different method.
Why: A mapping from the complex set to the complex set is represented through 4 axes, and the software that manages this complexity is mostly locked behind paywalls or desktop programs, this is a problem.
Why: Downloading dedicated software or paying a subscription is inconvenient, especially for hobbyists or students.
Why: There isn't a web-based tool for plotting complex valued functions.

Counter Measures:

- Deploy an online graphing tool that would allow users to write an expression in terms of a single variable and plot them.
- Have a process to interpret the user input, then display a plot over some input region, with a default value but modifiable by the user.
- The user can choose between modes for displaying the output.
- Users can also pan, zoom, and rotate the camera around the 3D region as they wish.

Check/Evaluate:

- Teachers introducing the ideas of multivariable/complex functions to students would use this tool in their lessons.
- Researchers and mathematics hobbyists use the tool to quickly and conveniently plot something that would have taken more effort before.
- Success is measured on the basis that most people switch from the old tools, meaning the advantages of the project outweigh the time cost of learning how to use a new tool.
- On the contrary, if people report the tool is troublesome to use, it did not tackle the main problem it was meant to solve.

Act/Standardize:

- Continue to work on UX and optimize the resource intensive parts of the tool.
- Implement features like Desmos.com, such as animated sliders for constants, statistical functions, differential and integral operators for analytic functions, saving into an account (with login optional for the save feature).
- Support for Quaternion functions through animations of transformations.