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Visualizing Topics from Differential Equations Using CalcPlot3D. Preliminary report.

A demonstration of how to use CalcPlot3D to visually verify and explore various topics in differential equations. Visually verify solutions of first order differential equations by varying the integration parameter in the general solution to show that it always fits the corresponding direction field. Explore the solutions of systems of two or three differential equations in their corresponding 2D and 3D phase plots. Consider the effect of a time parameter in non-autonomous systems.

CalcPlot3D is a freely available interactive online JavaScript app designed to enhance the teaching and learning of multivariable calculus, differential equations, and linear algebra.

In addition to the creation of CalcPlot3D, our project seeks to create a series of guided visual concept explorations to improve student understanding of multivariable calculus, differential equations and linear algebra and to use CalcPlot3D and these explorations to conduct research investigating how student understanding of these concepts changes through the use of visualization and dynamic concept explorations.

3D glasses will be provided for viewing 3D vector field phase portraits.

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