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The local brewery: a project for use in differential equations courses.

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Summary: We describe a modeling project designed for an ordinary differential equations (ODEs) course using first-order and systems of first-order differential equations to model the fermentation process in beer. The project aims to expose the students to the modeling process by creating and solving a mathematical model and effectively communicating their findings in a technical report. The students are required to produce a simple first-order differential equation and find the solution, given varying initial conditions. The students are also required to analyze a more complex, nonlinear ODE system model of the fermentation process. In dealing with the nonlinear system of equations, we provide the students a *Mathematica* file to reduce the time spent developing the model, but allow for more time to interpret the model. We also share some perspectives on the implementation of the project, provide alternative implementations, and possible extensions to the project.

Classification: I75 M65 U75

Keywords: differential equations; nonlinear systems of differential equations; beer fermentation

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