**Graphical Methods**

Andrew Moreau

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Abstract

This experiment centred around analysing differential equations using graphical methods to determine the dynamic and interesting points for the solutions without having to solve the equation using analytic or integrator methods. In order to effectively test this many problems were considered; a non-differential 2D problem to test the implementation, the harmonic oscillator problem looked at previously, the ‘Verhulst’ model (or Logistical Equation) and the ‘Lotka-Volterra’ model. The results show quite succinctly that the use of quiver and streamline plots create a new dynamic to understanding the dynamics of the systems. When combined with isoclines, it was also shown how these methods can be used to expand on parameters discussed in last week’s session such as stable and unstable fixed points.

Grader:

Tony Cafolla

This experiment is going to primary centre around certain plotting methods and how they apply to analysing differential problems. The primary plotting methods will involve quiver plots, streamline plots and isocline plots. Each of these methods will be accomplished by utilizing the Python 3 library MatPlotLib.

A quiver plot is one that places velocity vectors with components (U, V) at the points (X, Y). In vector calculus it is analogous to a vector field. In mathematics they can be constructed when the gradient operator is applied to a scalar field