CAS 741: Problem Statement
Analysis and Benchmarking of a Family of
Non-commercial ODE Solvers

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Table 1: Revision History

Date	Developer(s)	Change
September 15, 2017	Paul Aoanan	Initial Draft

Known elementary techniques of solving ordinary differential equations (ODEs) use the linear approximation method wherein the solution is based upon assuming or "approximating" the slope of the tangent line from one reference point to the next until the target point has been reached.

The goal is to find a step-size so small that the approximate tangent line coincides with the true curve.

Since these methods only yield approximate solutions, these methods introduce an error term to the solution.

As well, the use of a small, near infinitesimal, step-size in machine computing can lead to a large number of iterations and the introduction of round-off errors. Alternatively, the use of a large step size can miss the goal of approximating the true curve.

Multiple methods in solving ODEs exist. Examples of which are the following:

- Euler's Method

- Heun's Method (Modified Euler's Method)

- Fourth Order Taylor Series Method

- Fourth Order Order Runge-Kutta Method

These different methods vary in accuracy due to the error terms inherent in each technique.

The problem exists in finding the most accurate method (the method which produces the least error) in its scientific computing implementation.