Numerical Analysis Homework 4

Margaret Dorsey

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Programs and outputs are available as *.c* files and in the *outputs* directory, respectively.

Problems 1, 2, and 3

ODE	Euler Steps	RK2 Steps	RK4 Steps
1	4580607	922	37
2	500008	250	12
3	535406	552	13

Problem 4

$y(5)$ is calculated to be -1536638120.74638 in 493 steps of Runge-Kutta 4th order, which compared to the actual solution at $t = 5$, -1536638135.98543, gives a relative error of approximately 9.917×10^{-9}.

Problem 5 and 6

Method	Actual Value	RK4 Init	Solution Init	RK4 Init Error	Solution Init Error
AB	145.235098283	145.231963680	145.231963670	3.0×10^{-9}	1.3×10^{-8}
AM	145.235098283	145.234252865	145.234252867	8.45×10^{-4}	8.45×10^{-4}