

Assignment 1, due Friday, 8th October

Theoretical:

Prove that any C^1 function $f : D \subset \mathbb{R}^n \rightarrow \mathbb{R}^m$ is Lipschitz with constant L on any convex region $D \subset \mathbb{R}^n$ where $\|Df(x)\| \leq L$.

Computational:

Implement Euler's method and use it to solve

$$\frac{dy}{dt} = \frac{3t^2 + 4t + 2}{2(y - 1)}, \quad y(0) = -1.$$

Give the solution at $t = 2.0$ using timesteps $h = 0.1, 0.05, 0.025$. In addition, give the error in the solution at $t = 2.0$ using timesteps $h = 0.1, 0.05, 0.025$.