PNS Assignment 1

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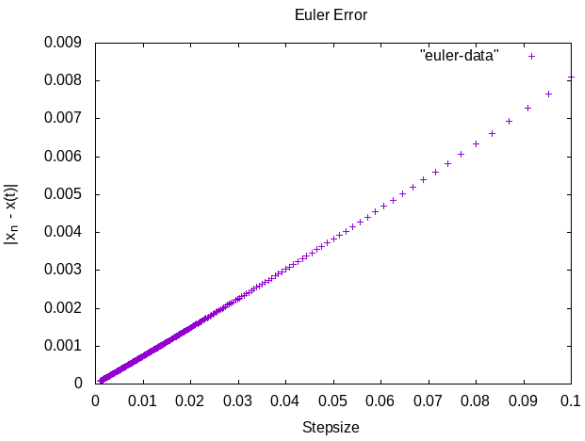
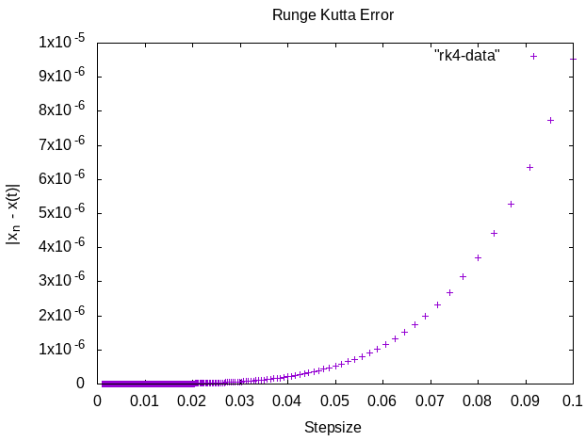
1 Question One

Analytic Solution:

$$\frac{dx}{dt} = t(x^2 - 1)$$
$$\int_0^x \frac{dx}{x^2 - 1} = \frac{t^2}{2}$$
$$\frac{1}{2}\int_0^x \left(\frac{1}{1-x} - \frac{1}{1+x}\right) dx = \frac{t^2}{2}$$
$$\ln\left(\frac{1-x}{1+x}\right) - i\pi = t^2$$
$$\implies x(t) = \frac{1 - e^{t^2}}{1 + e^{t^2}}$$





2 Question Two

Solution is $x_0(50) = 1.97347$