Ay190 – Worksheet 10
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1 Simple Boundary-Value Problem

We will solve the following ODE.

$$\frac{d^2y}{dx^2} = 12x - 4, y(0) = 0, y(1) = 0.1$$

First we rewrite the second-order ODE as a system of two first-order ODEs:

$$\frac{dy}{dx} = u(x)$$

$$\frac{du}{dx} = 12x - 4$$

.

We implement the forward euler integrator as well as the RK2 integrator. We can see in 1 that the RK2 integrator comes the closer to the true solution $y(x) = 2x^3 - 2x^2 + 0.1x$ than the Euler Integrator, though they both approximate the solution reasonably well.
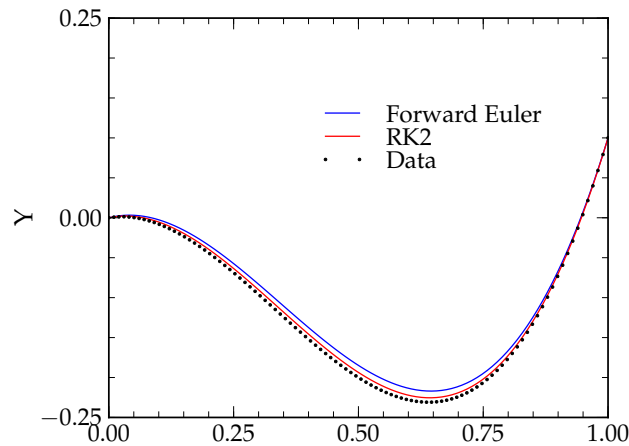

Figure 1: Convergance of Forward Euler and RK2 to the solution $y(x) = 2x^3 - 2x^2 + 0.1x$