

Math128B
Mar. 1, 2005
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Homework 6 Solutions

file	function
Hmwk6Main.m	calls Euler (Problem 1) to compute $v(6)$ for IVP: $v'(t) = 32 - 0.032 v^{\frac{3}{2}}, v(0) = 0$ calls Heun (Problem 2) to solve IVP: $y'(t) = t^2 - y, t \in [0, 2], y(0) = 1$ calls Taylor4 (Problem 3) to solve IVP: $y'(t) = t^2 - y, t \in [0, 2], y(0) = 1$ compares FinalGlobalError for $h = 0.1$ and $h = 0.05$ to verify order of each method
Euler.m	implements p.466 of Mathews & Fink (Program 9.1 with some modifications)
Heun.m	implements p.477 of Mathews & Fink (Program 9.2 with some modifications)
MyTaylor4.m	implements p.483 of Mathews & Fink (Program 9.3 with some modifications)
AirResistance.m	implement specifics of each ODE $v'(t) = 32 - 0.032v^{\frac{3}{2}}$
DF4.m	implement specifics of each ODE $y'(t) = t^2 - y$

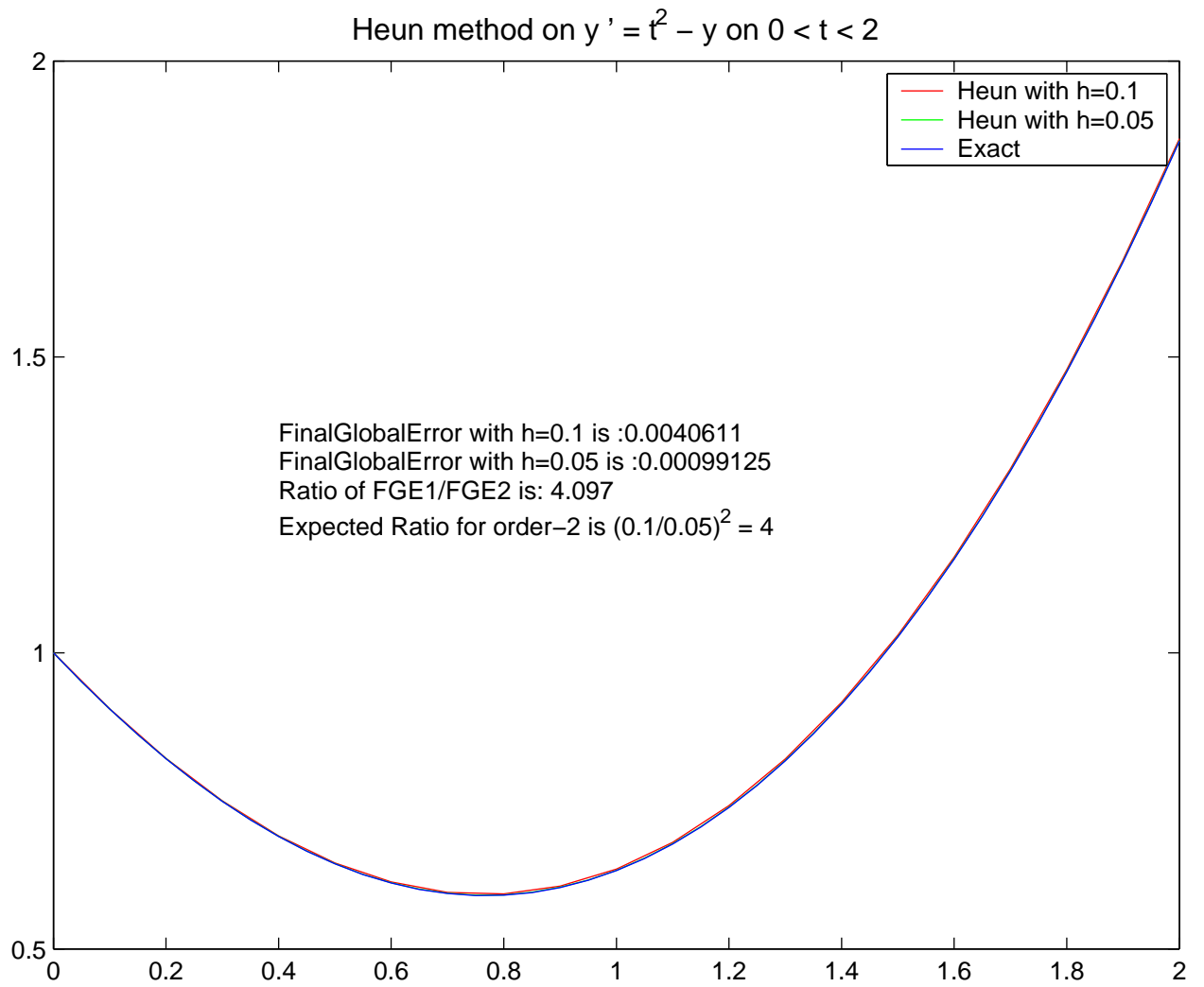
A diary of the output follows:

```
Hmwk6Main
%%%%%%%%%% Problem #1 %%%%%%%%%%%
velocity at time t=6 using Forward Euler is v(6)=92.4979

%%%%%%%%%% Problem #2 %%%%%%%%%%%
FinalGlobalError with h=0.1 is :0.0040611
FinalGlobalError with h=0.05 is :0.00099125
Ratio of FGE1/FGE2 is: 4.097
Expected Ratio for order-2 is (0.1/0.05)^2 = 4

%%%%%%%%%% Problem #3 %%%%%%%%%%%
FinalGlobalError with h=0.1 is :2.4519e-007
FinalGlobalError with h=0.05 is :1.4698e-008
Ratio of FGE1/FGE2 is: 16.682
Expected Ratio for order-4 is (0.1/0.05)^4 = 16
```

Example of graphical output:



Example of graphical output:

