Assignment 4

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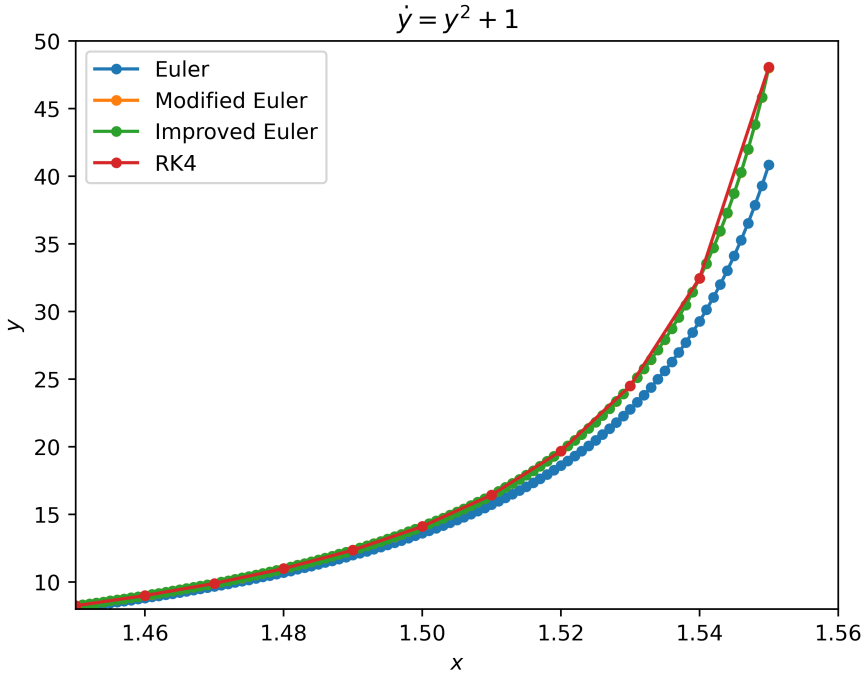
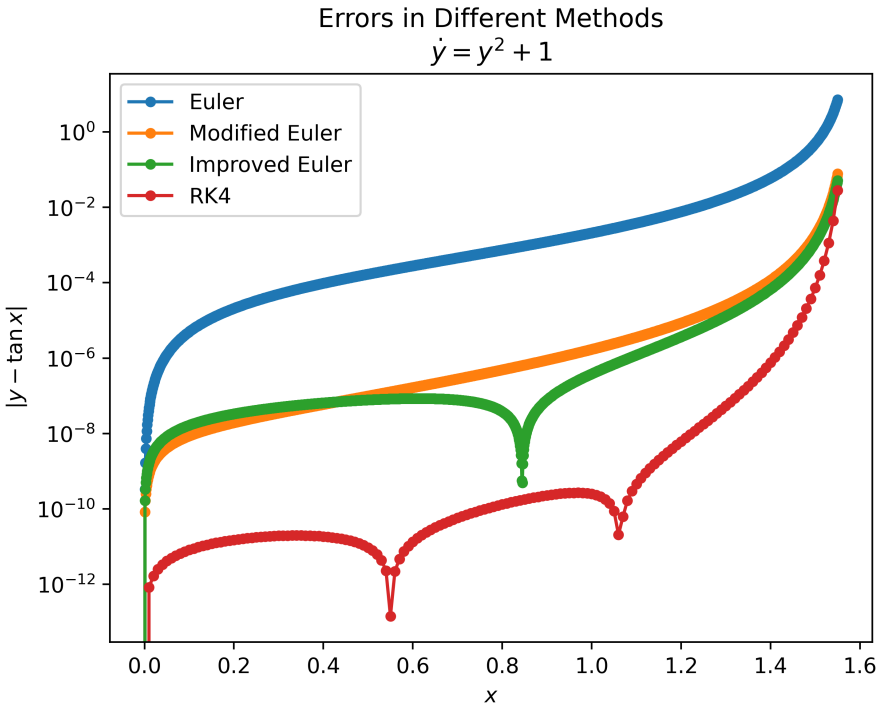




1

$y_A - y_E = 7.2480127425352805$

2

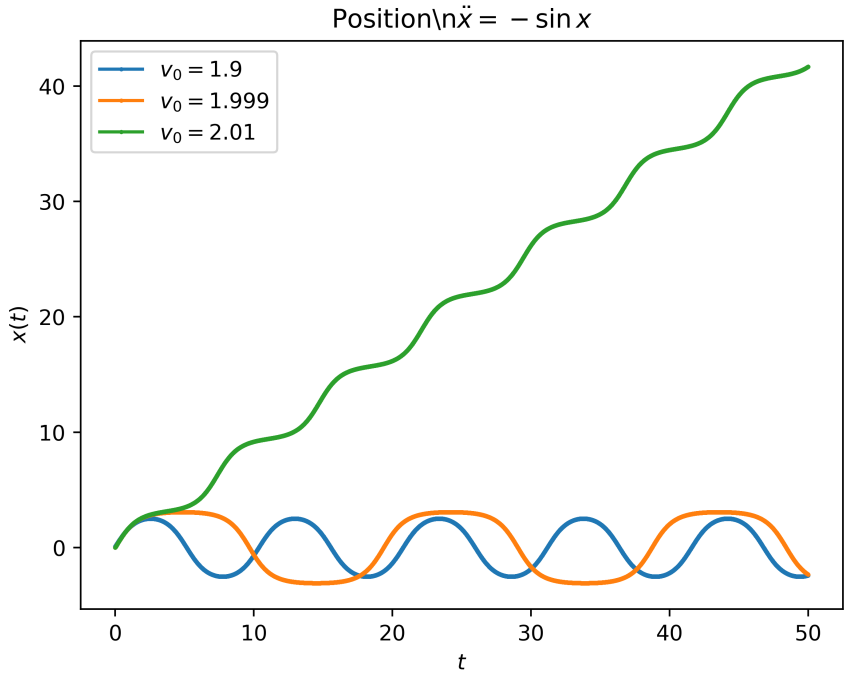
$y_A - y_{ME} = 7.7427569312206401\text{E-}002$

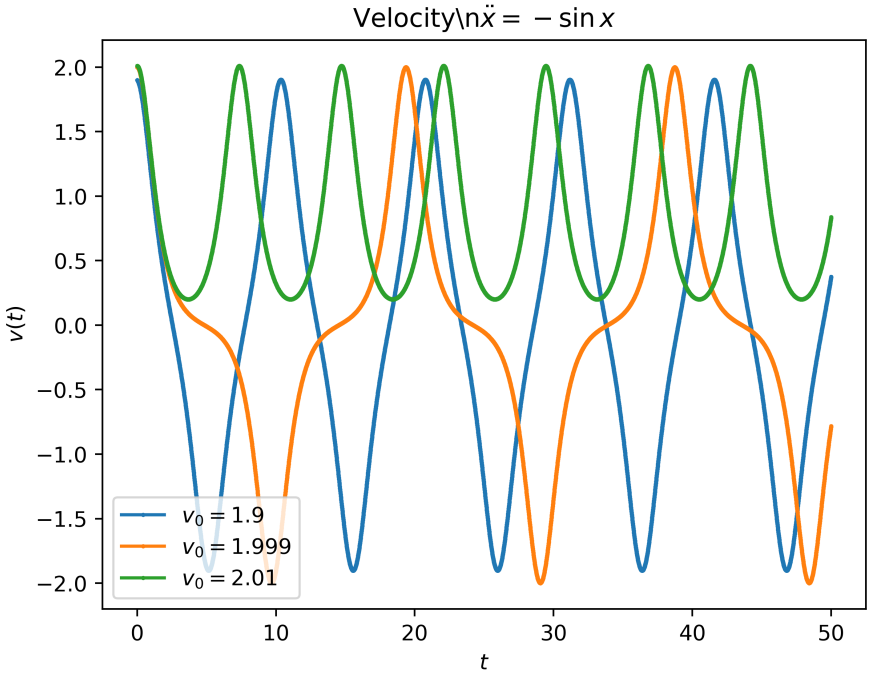
3

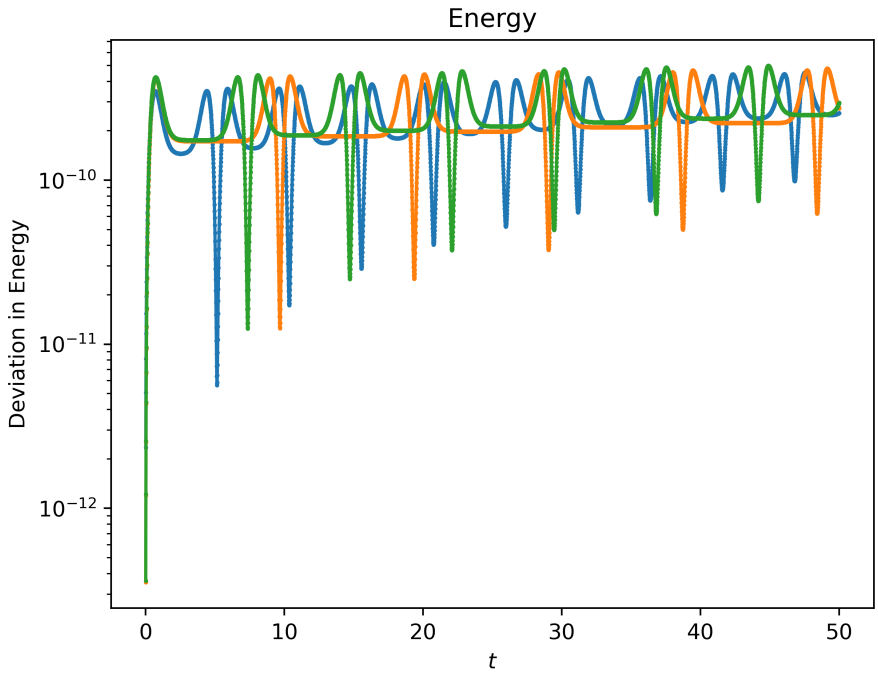
$y_A - y_{IE} = 5.1655161319146714\text{E-}002$

4

$y_A - y_{RK} = 2.8227068894551621\text{E-}002$


Position\n$\ddot{x} = -\sin x$
$v_0 = 1.9$
$v_0 = 1.999$
$v_0 = 2.01$
$x(t)$
t
0
10
20
30
40
50


Velocity\n$\ddot{x} = -\sin x$
$v_0 = 1.9$
$v_0 = 1.999$
$v_0 = 2.01$
$v(t)$
t
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0
10
20
30
40
50



The equation of motion for a pendulum is $ml^2\ddot{\theta} = -mgl\sin\theta$ and the initial angular velocity for which the particle goes around the circle is

$$\frac{1}{2}ml^2\omega^2 = 2mgl \implies \omega = 2\sqrt{\frac{g}{l}}$$

5

With $v_0 = 1.9$, $x(50)$ = -2.4031208066181056

6

With $v_0 = 1.999$, $x(50)$ = -2.3334226453994074

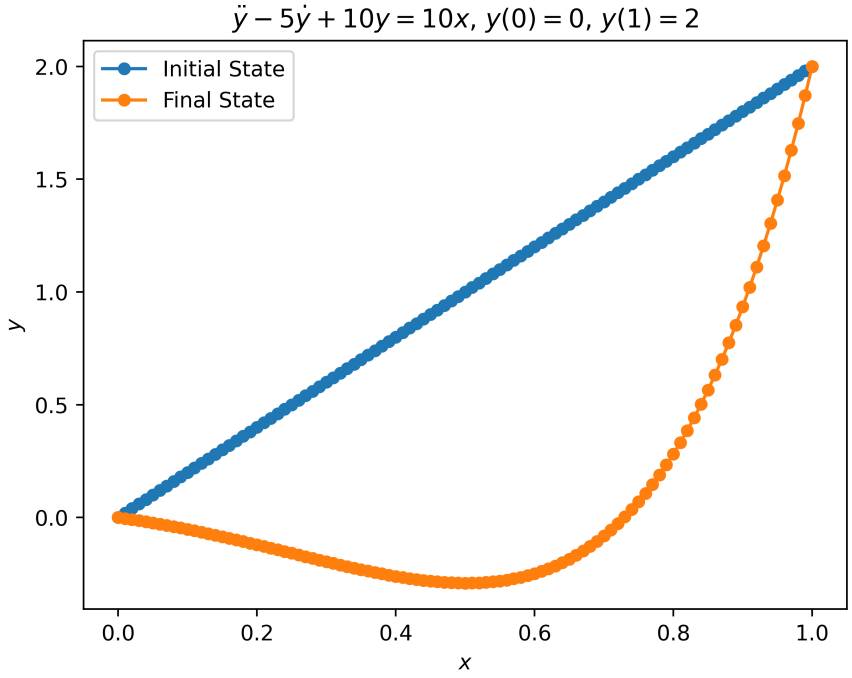
7

With $v_0 = 2.01$, $x(50)$ = 41.676956106389959

8

$y_1(40)$ = -0.11891893262315607

9



$y(0.8) = 0.28147010284957907$