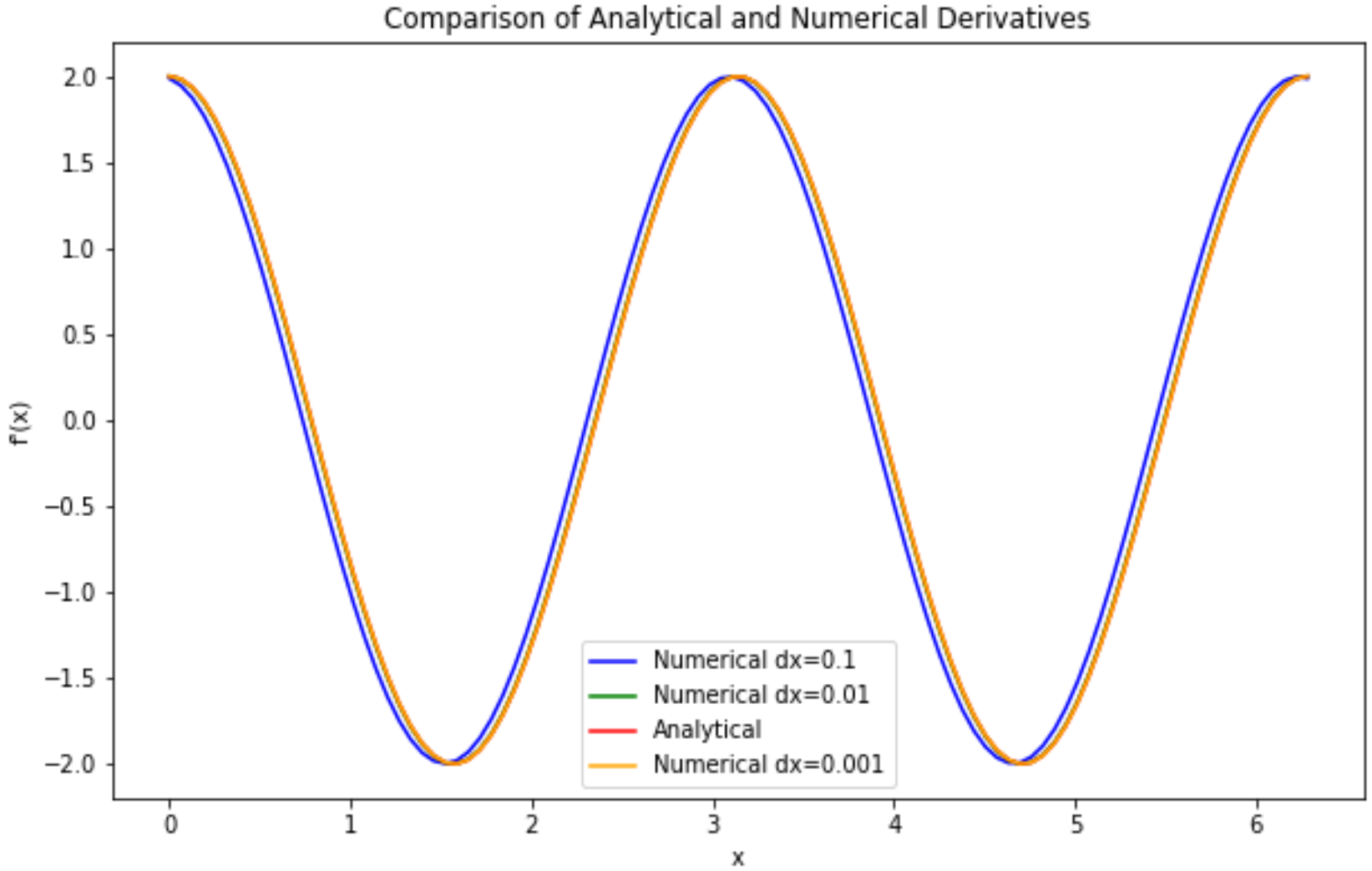
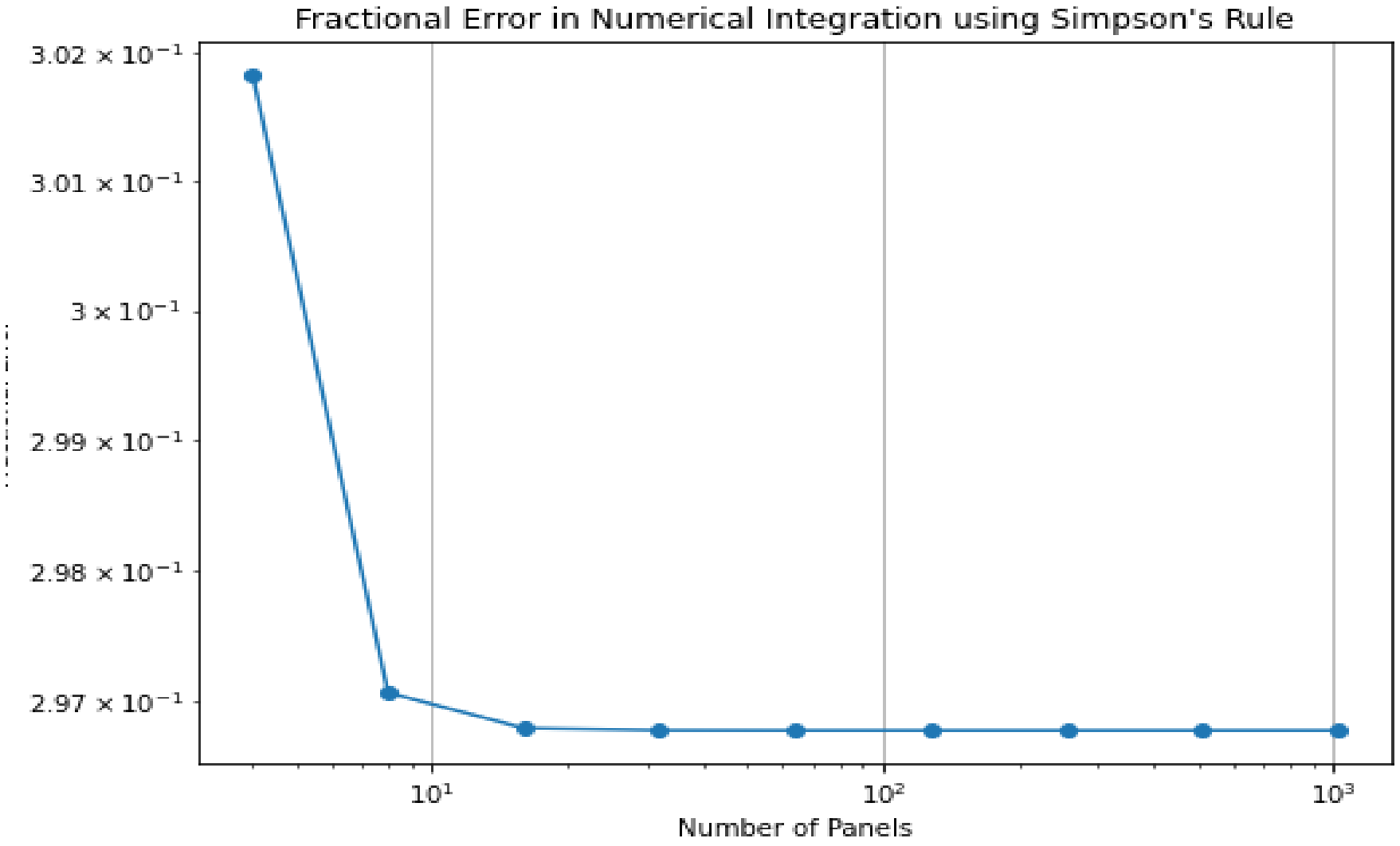
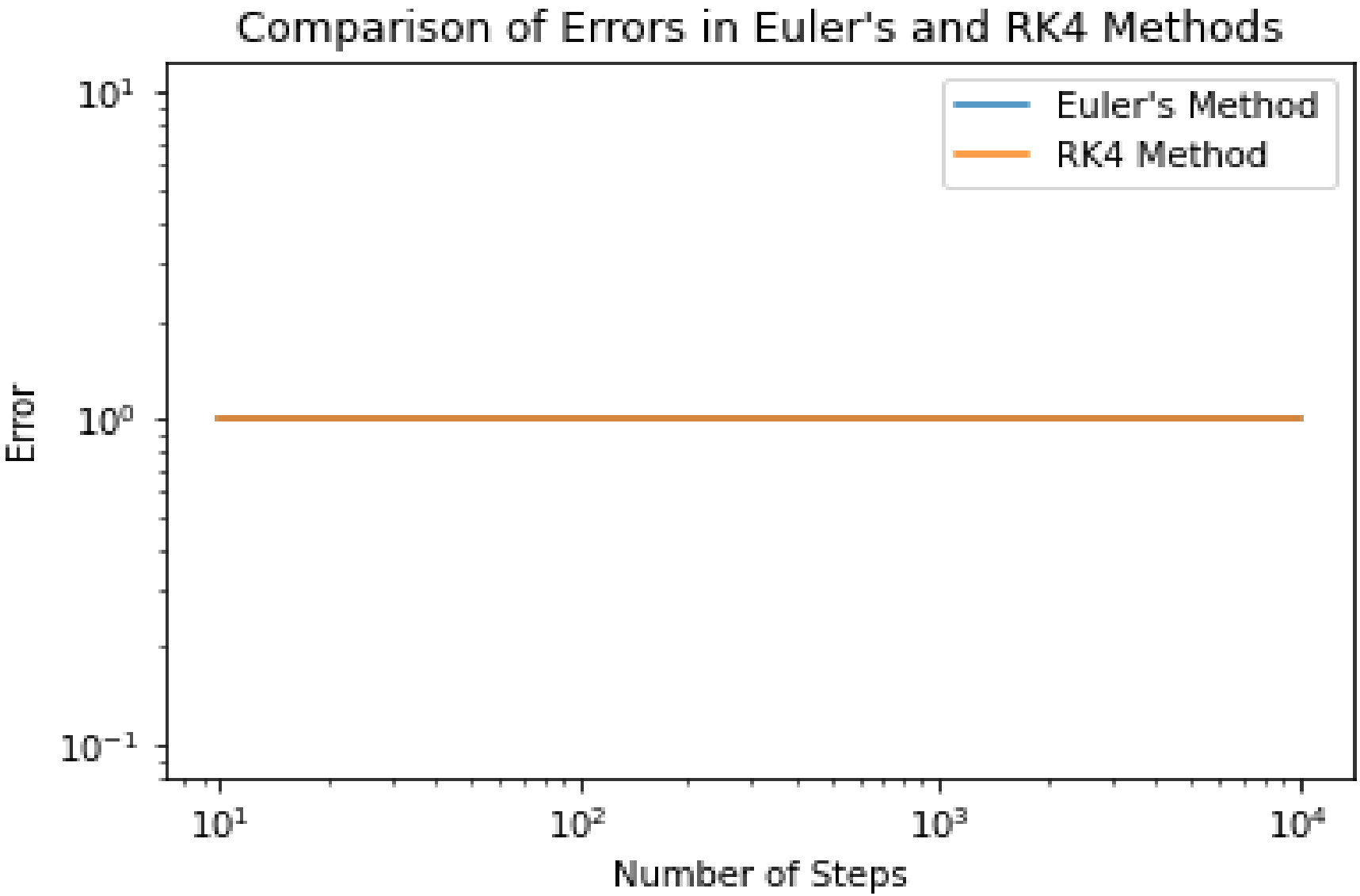
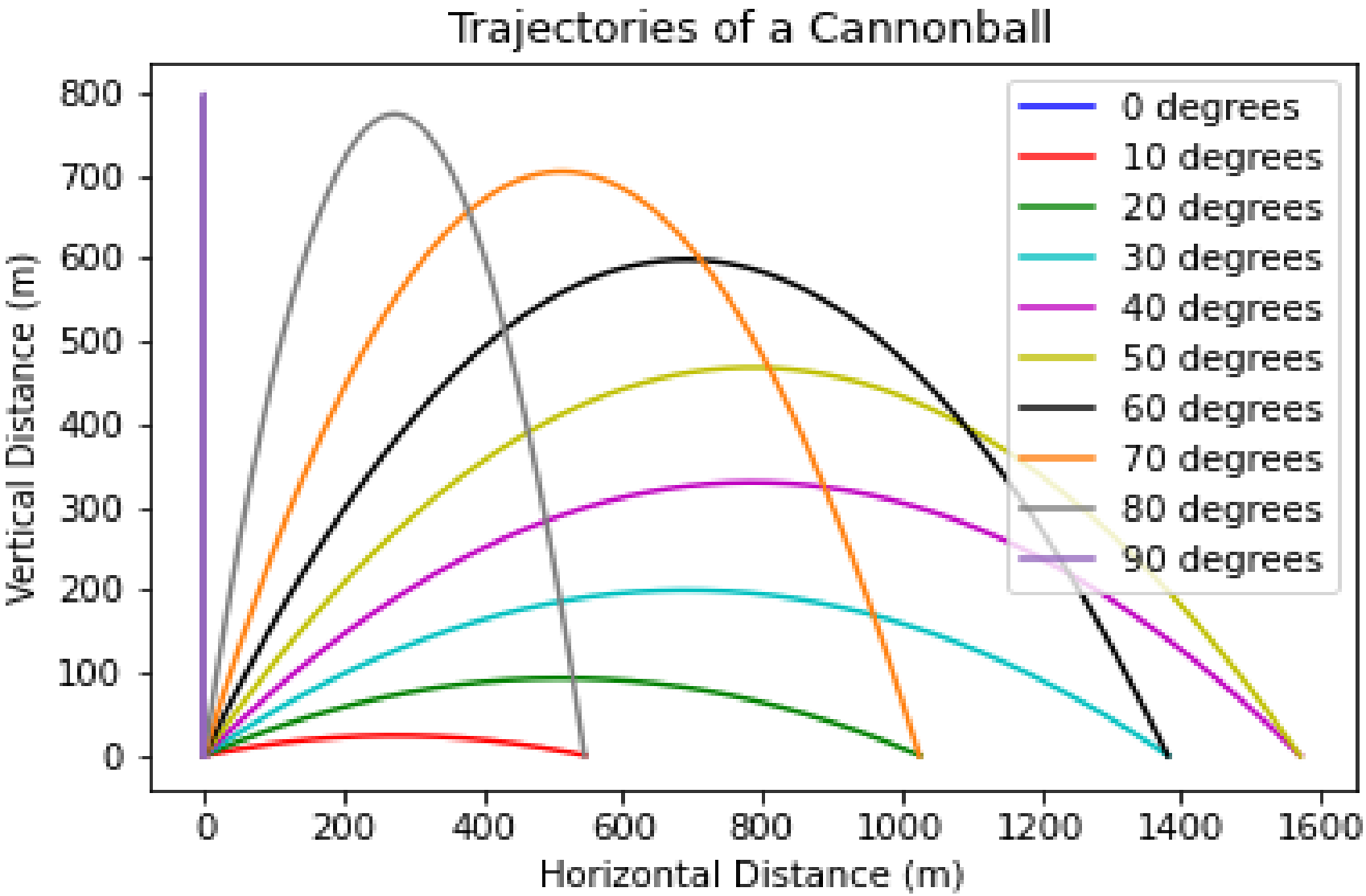
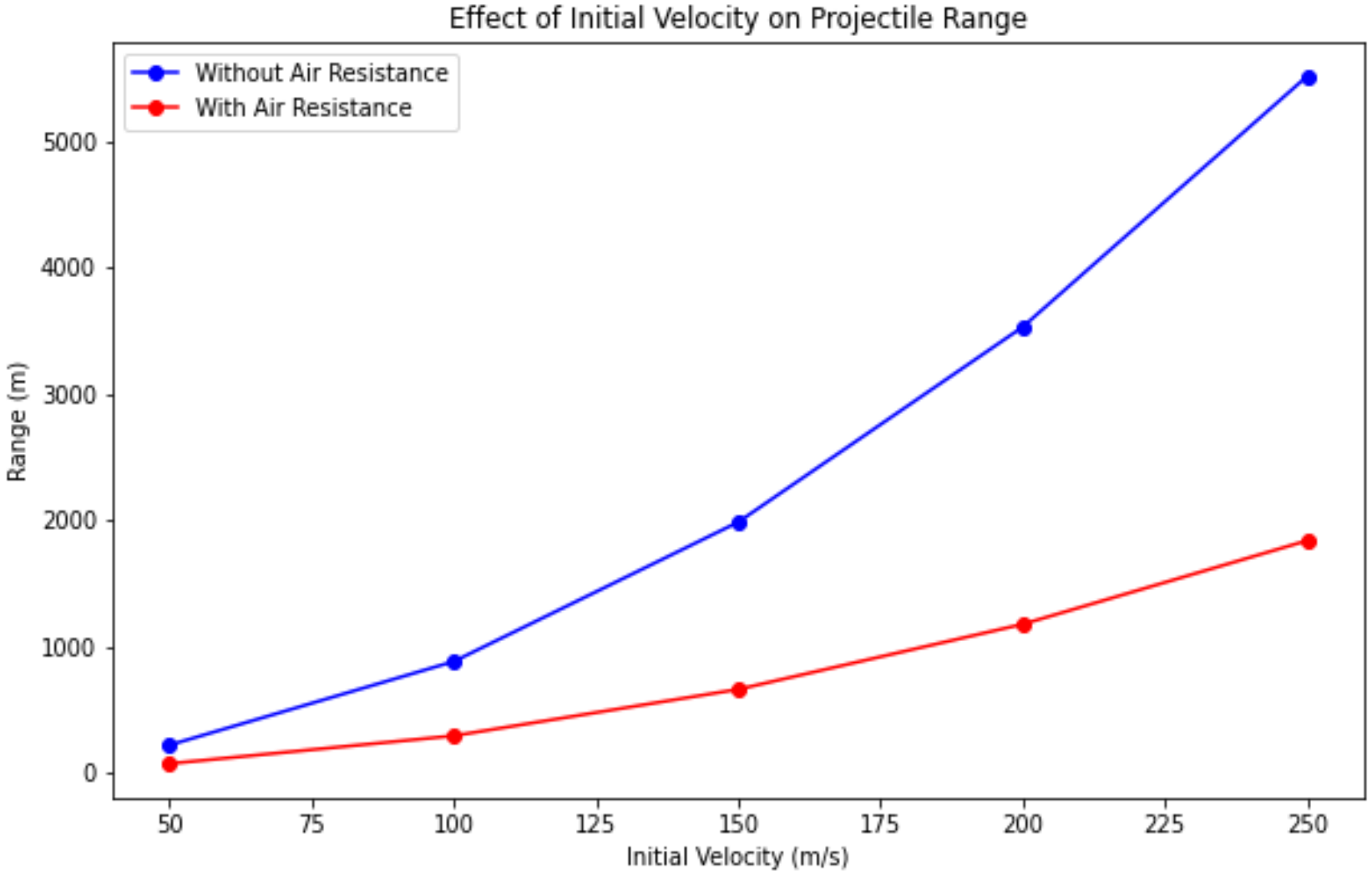
38566

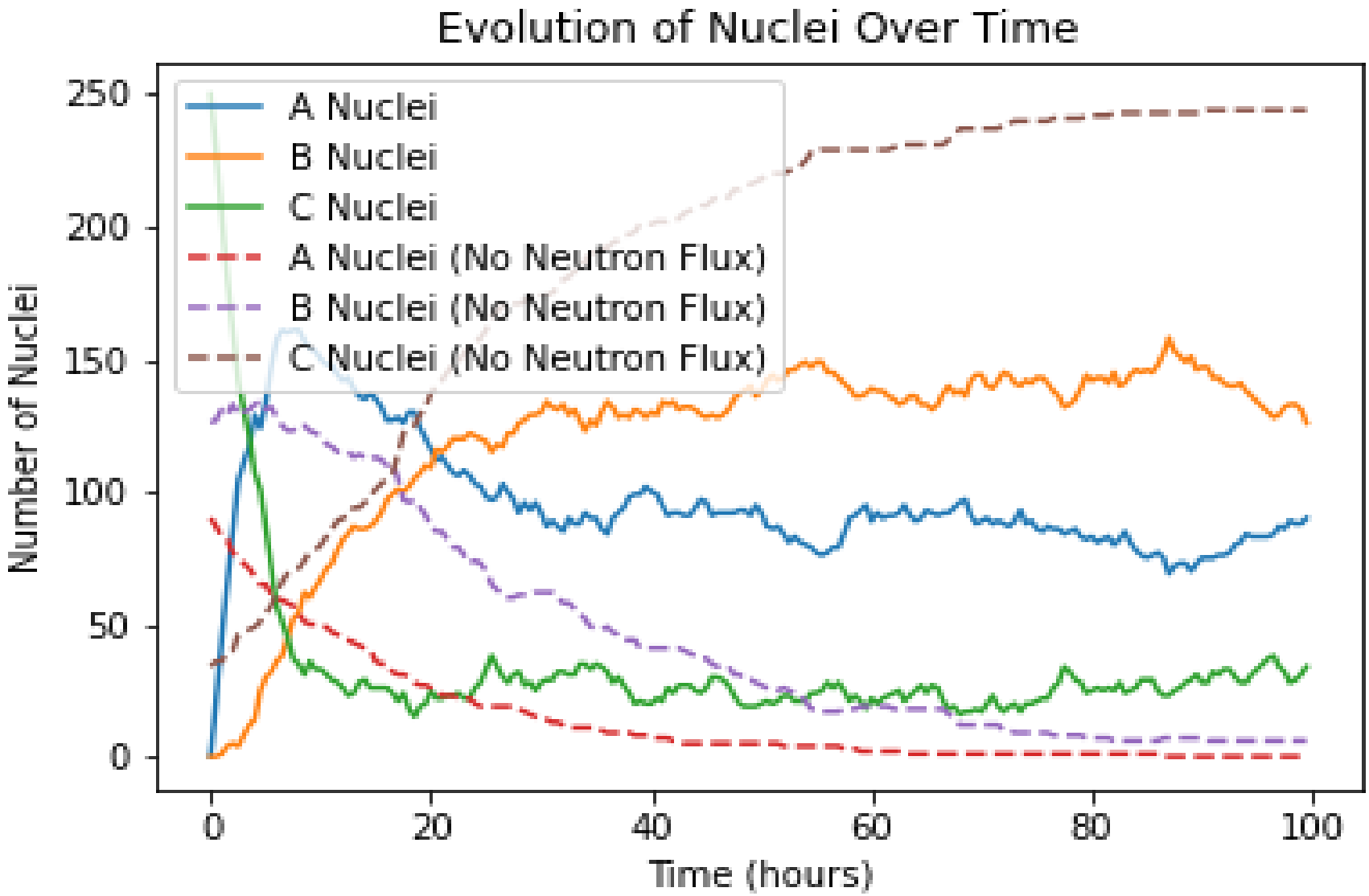

Comparison of Analytical and Numerical Derivatives
f'(x)
x
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0
1
2
3
4
5
6
Numerical dx=0.1
Numerical dx=0.01
Analytical
Numerical dx=0.001

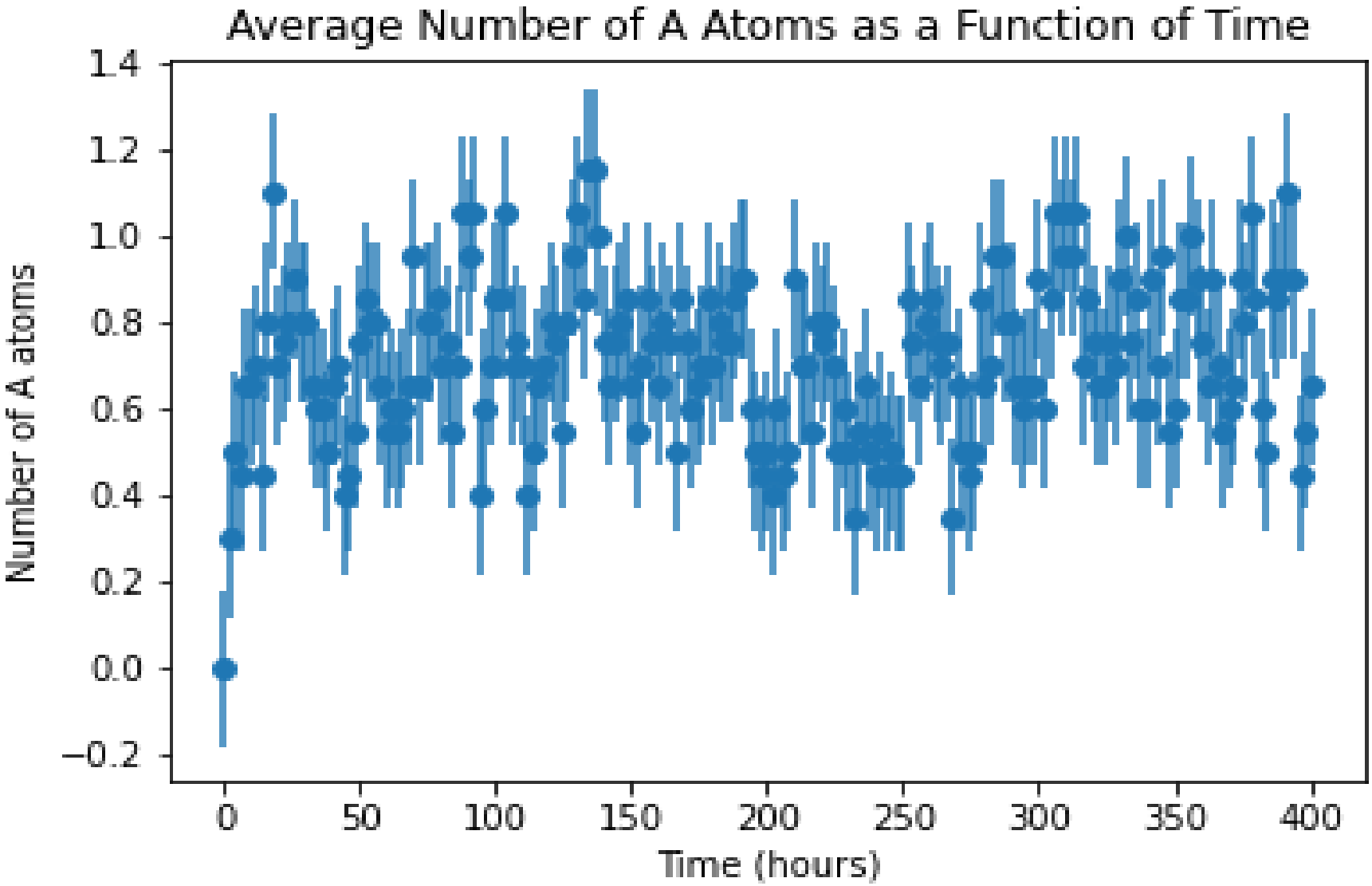

Fractional Error in Numerical Integration using Simpson's Rule
3.02 × 10⁻¹
3.01 × 10⁻¹
3 × 10⁻¹
2.99 × 10⁻¹
2.98 × 10⁻¹
2.97 × 10⁻¹
10¹
10²
10³
Number of Panels

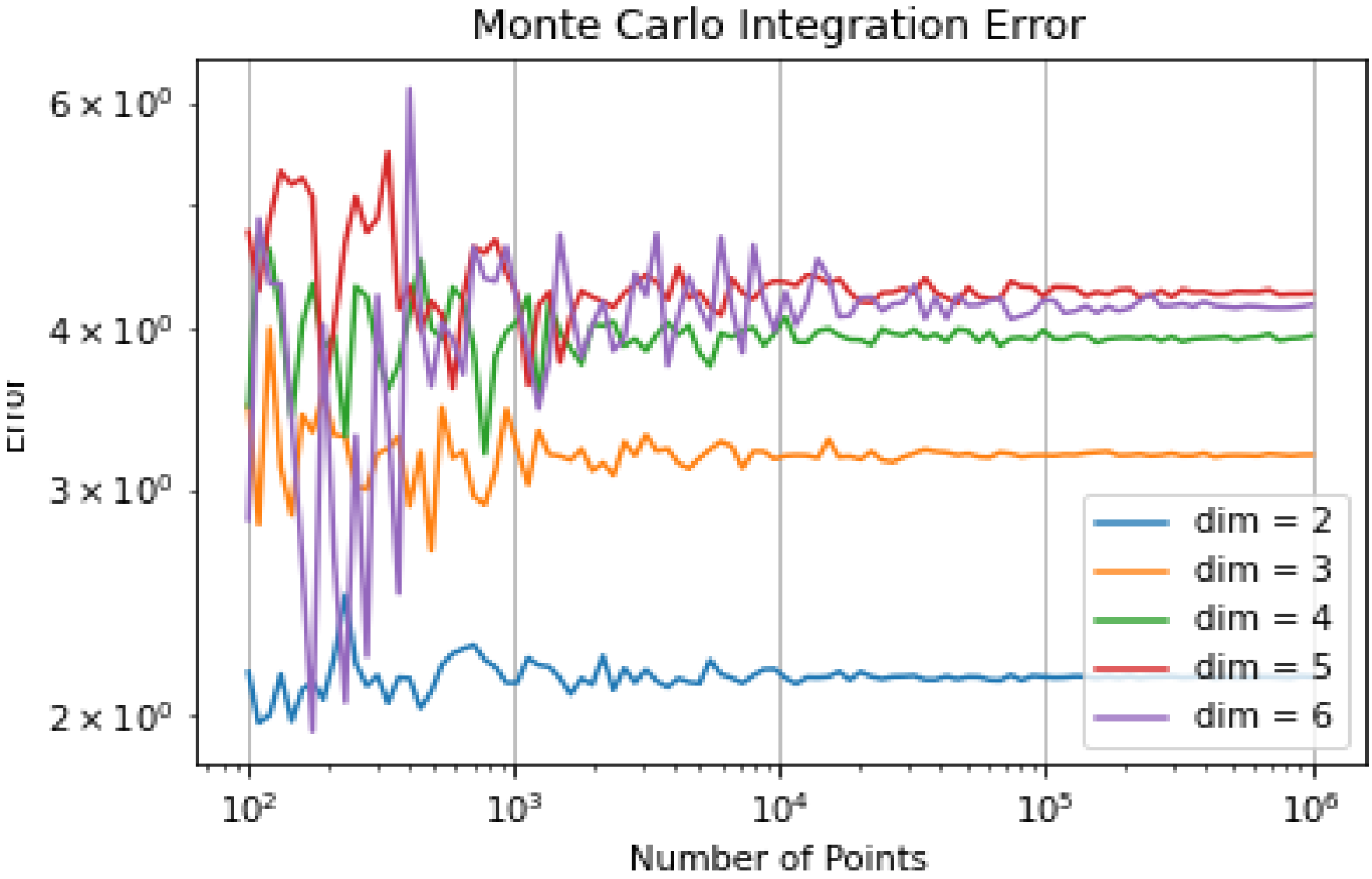

Comparison of Errors in Euler's and RK4 Methods
Euler's Method
RK4 Method
Error
10^{1}
10^{0}
10^{-1}
10^{1}
10^{2}
10^{3}
10^{4}
Number of Steps

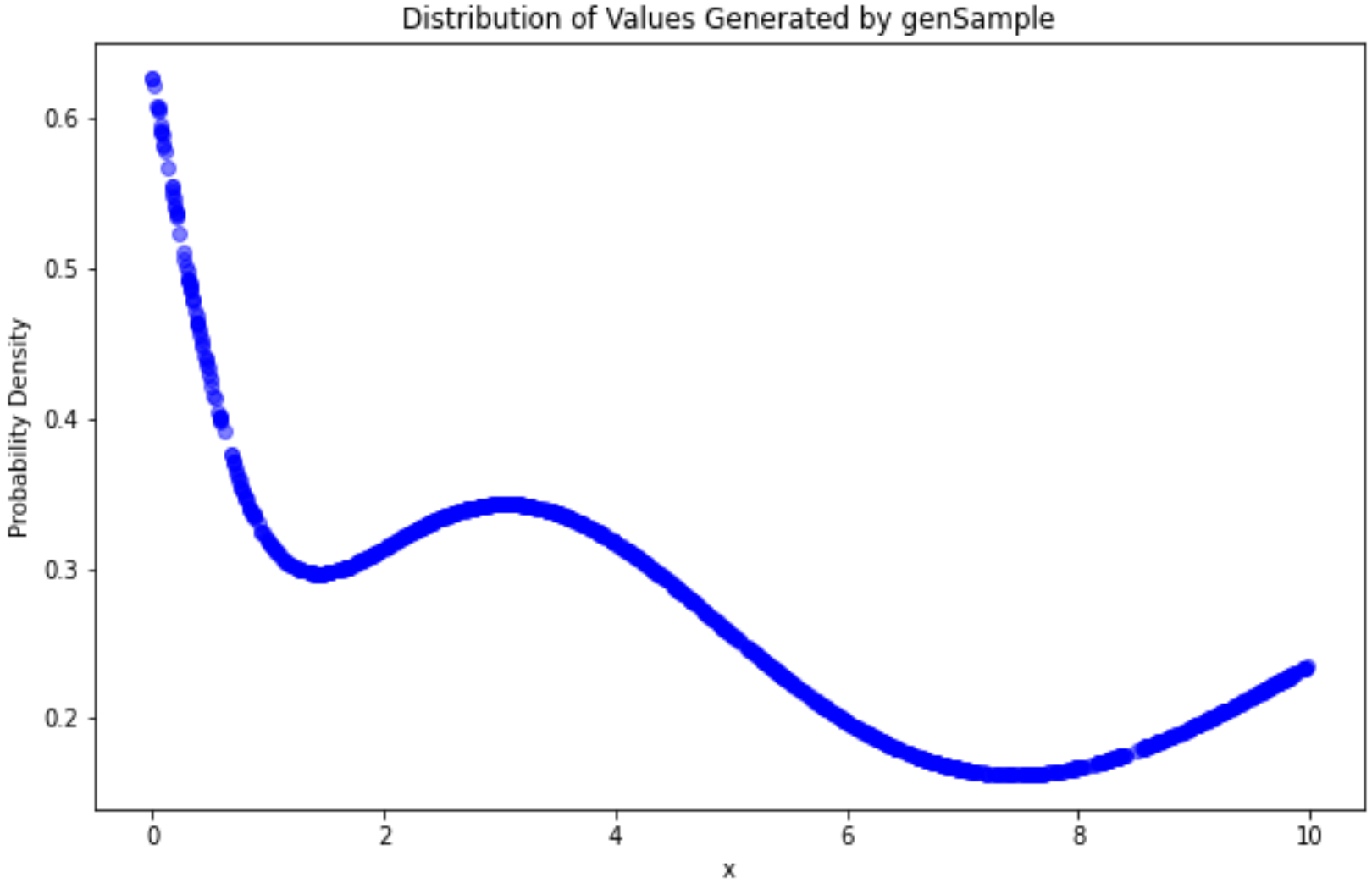

Trajectories of a Cannonball
Vertical Distance (m)
Horizontal Distance (m)
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
0 degrees
10 degrees
20 degrees
30 degrees
40 degrees
50 degrees
60 degrees
70 degrees
80 degrees
90 degrees

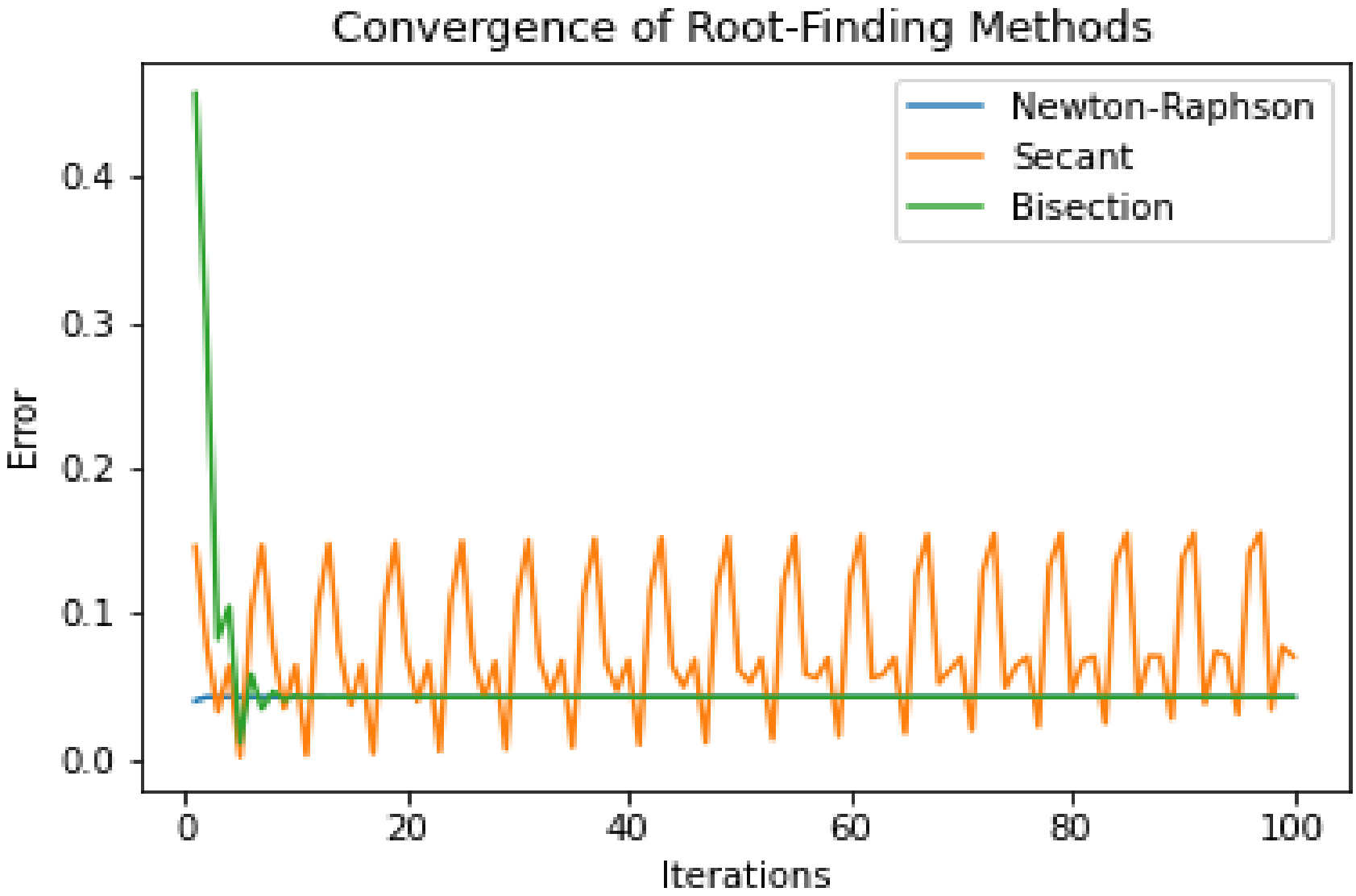

Effect of Initial Velocity on Projectile Range
Without Air Resistance
With Air Resistance
Range (m)
0
1000
2000
3000
4000
5000
50
75
100
125
150
175
200
225
250
Initial Velocity (m/s)

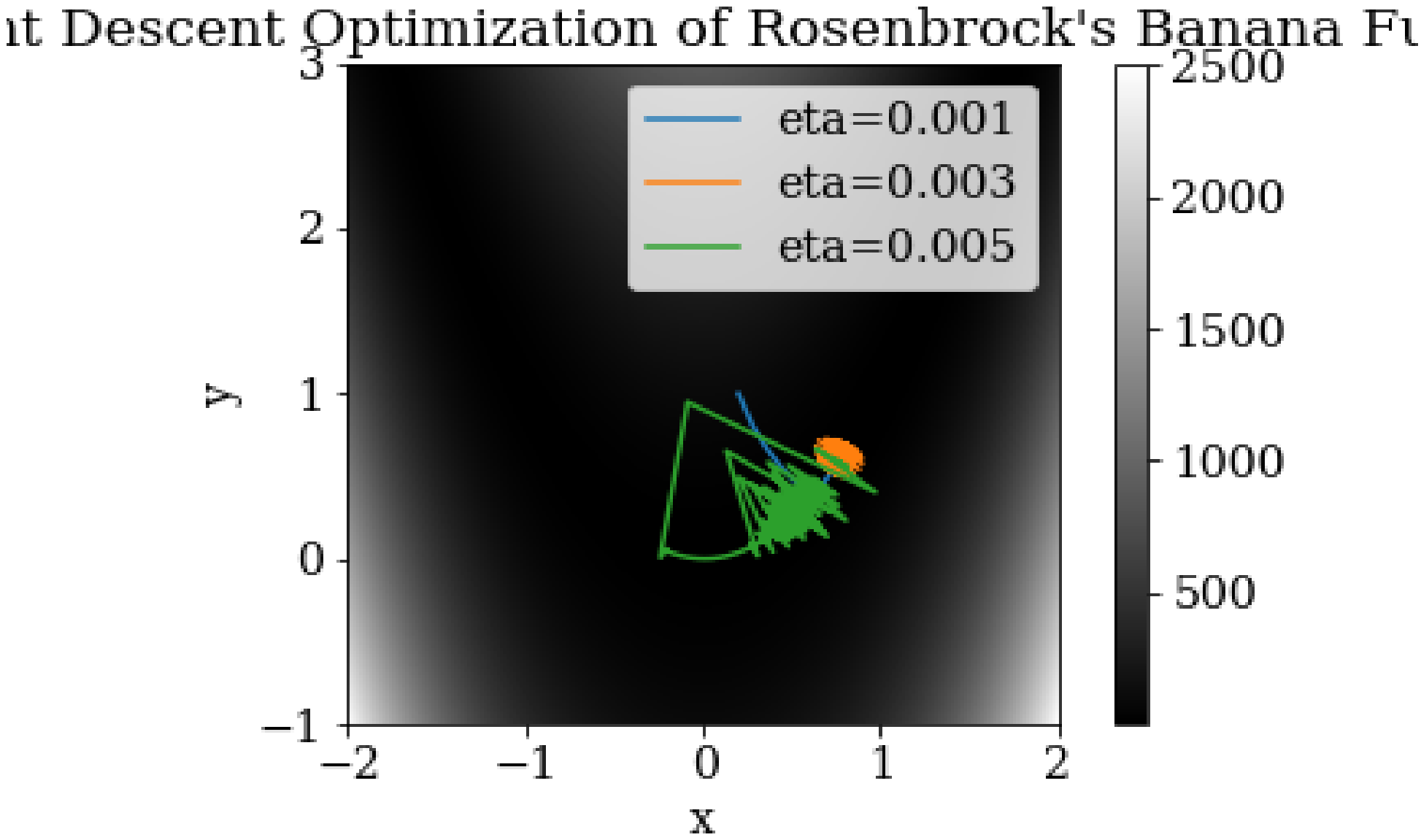

Evolution of Nuclei Over Time
A Nuclei
B Nuclei
C Nuclei
A Nuclei (No Neutron Flux)
B Nuclei (No Neutron Flux)
C Nuclei (No Neutron Flux)
Number of Nuclei
Time (hours)
0
50
100
150
200
250
0
20
40
60
80
100

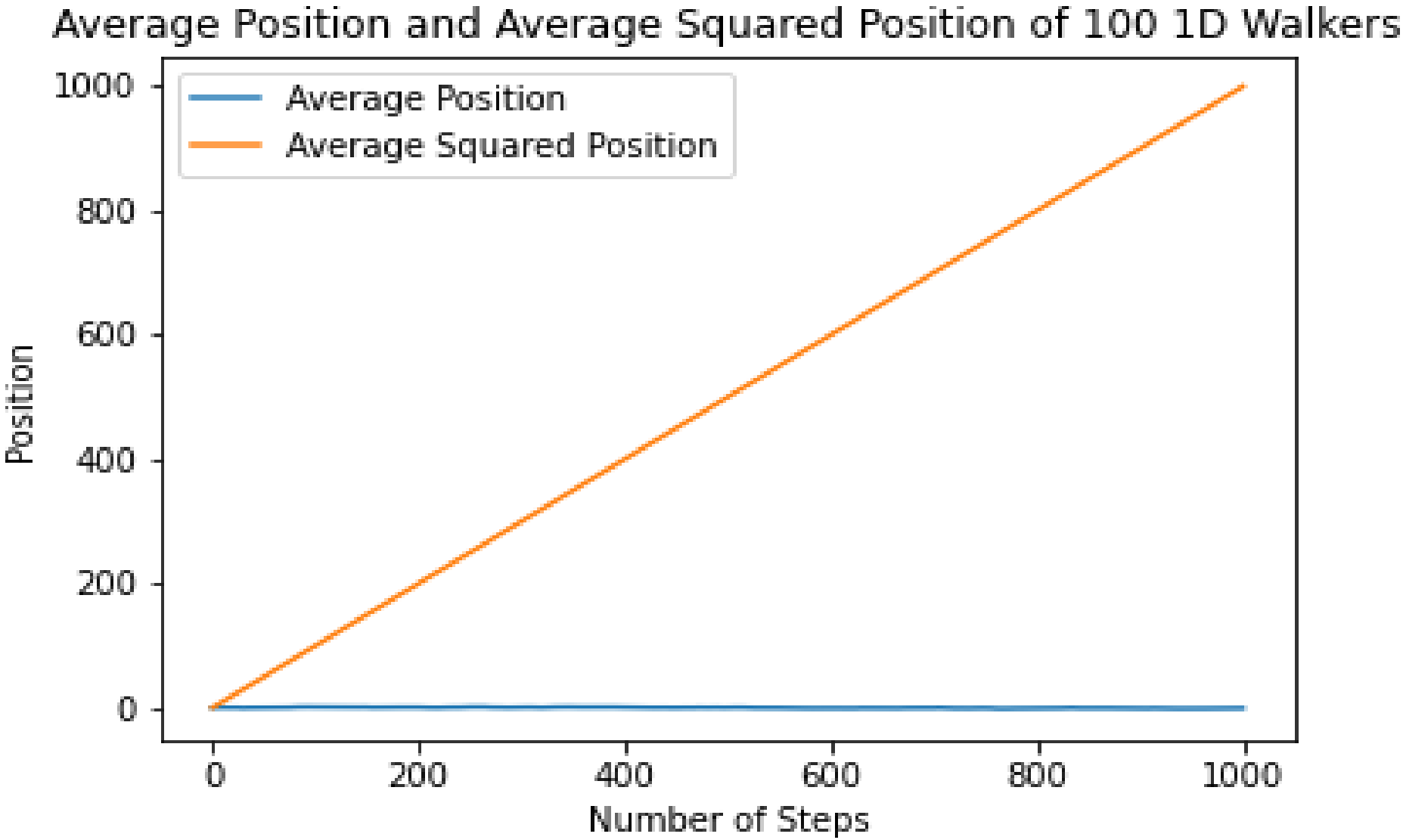

Average Number of A Atoms as a Function of Time
Number of A atoms
Time (hours)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
0
50
100
150
200
250
300
350
400

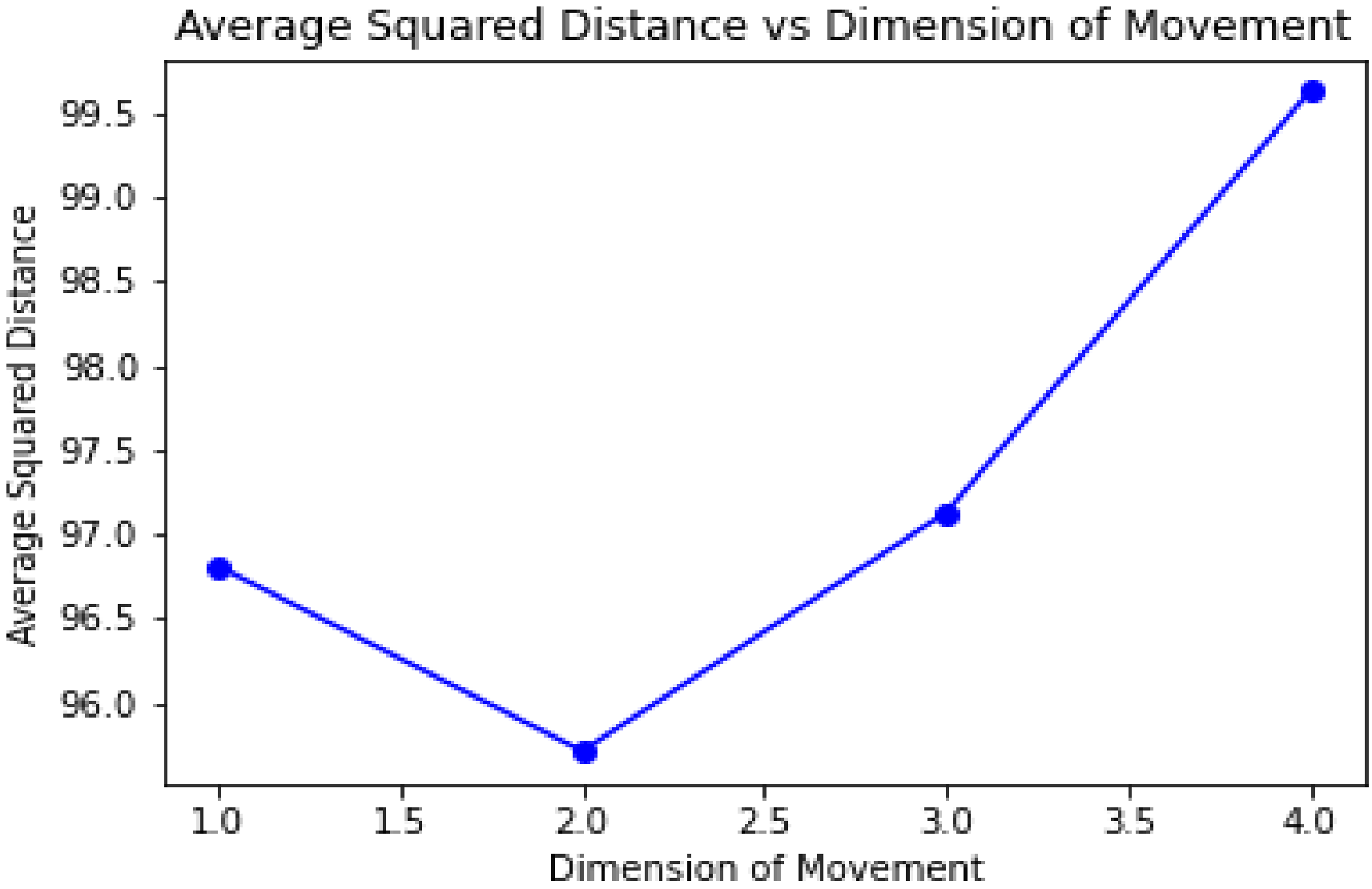

Monte Carlo Integration Error
6 × 10^0
4 × 10^0
3 × 10^0
2 × 10^0
Error
10^2
10^3
10^4
10^5
10^6
Number of Points
dim = 2
dim = 3
dim = 4
dim = 5
dim = 6

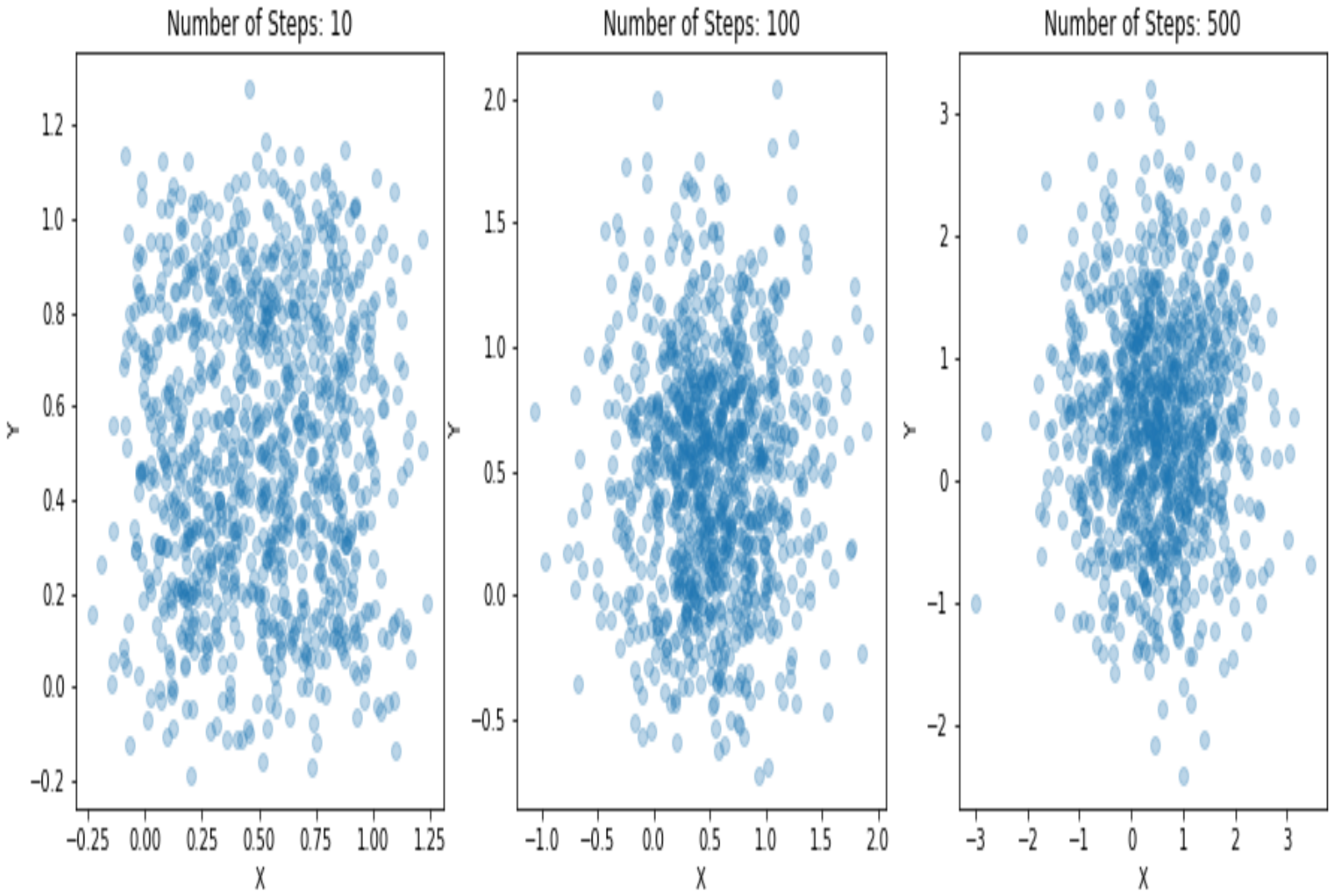

Distribution of Values Generated by genSample
Probability Density
0.6
0.5
0.4
0.3
0.2
0
2
4
6
8
10
x


Convergence of Root-Finding Methods
Newton-Raphson
Secant
Bisection
Error
0.0
0.1
0.2
0.3
0.4
0
20
40
60
80
100
Iterations


ıt Descent Optimization of Rosenbrock's Banana Fu
eta=0.001
eta=0.003
eta=0.005
3
2
1
0
−1
y
−2
−1
0
1
2
x
2500
2000
1500
1000
500


Average Position and Average Squared Position of 100 1D Walkers
Average Position
Average Squared Position
Position
Number of Steps
0
200
400
600
800
1000


Average Squared Distance vs Dimension of Movement
Average Squared Distance
99.5
99.0
98.5
98.0
97.5
97.0
96.5
96.0
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Dimension of Movement


Number of Steps: 10
Number of Steps: 100
Number of Steps: 500
X
Y

AI?