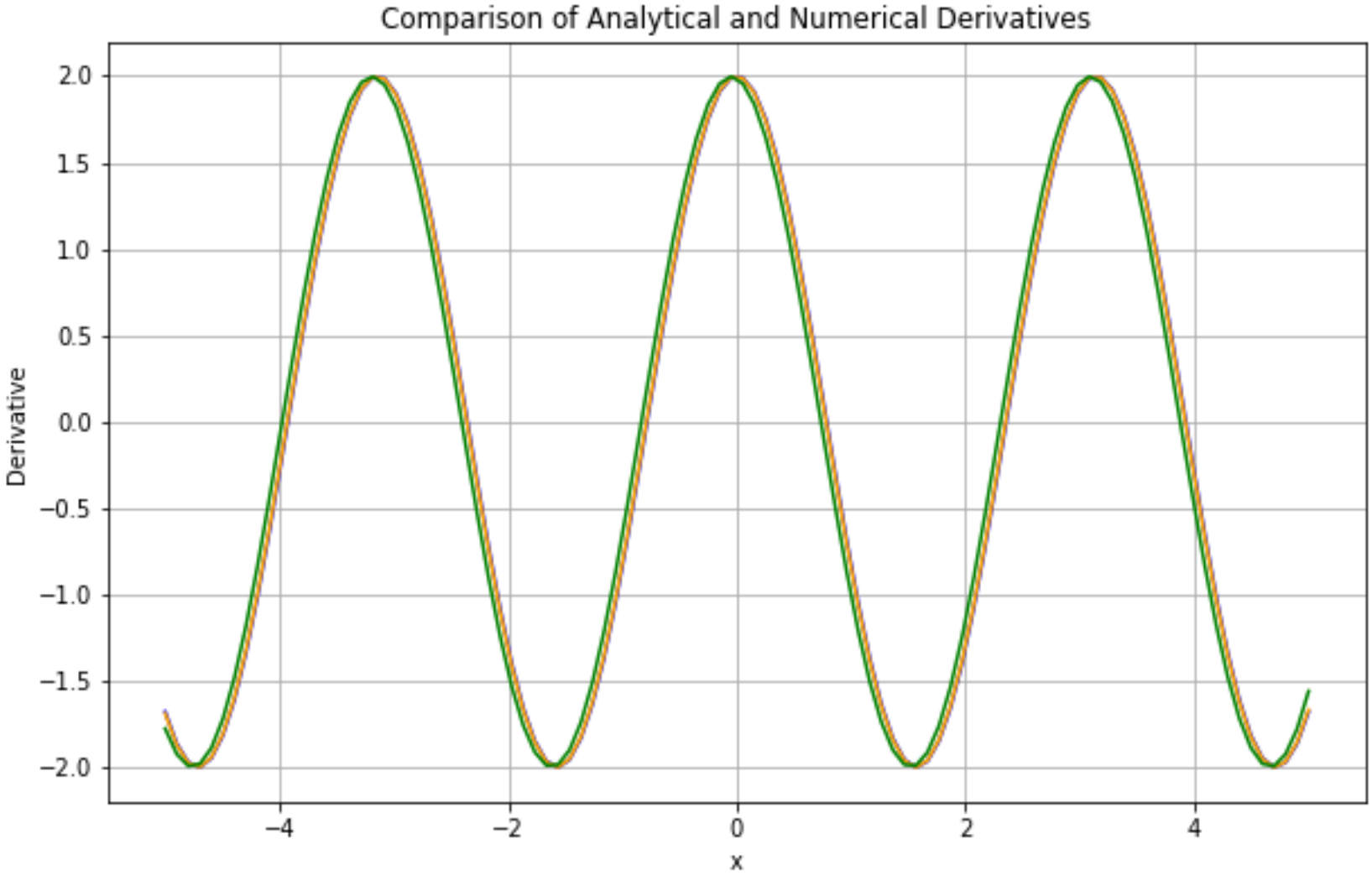
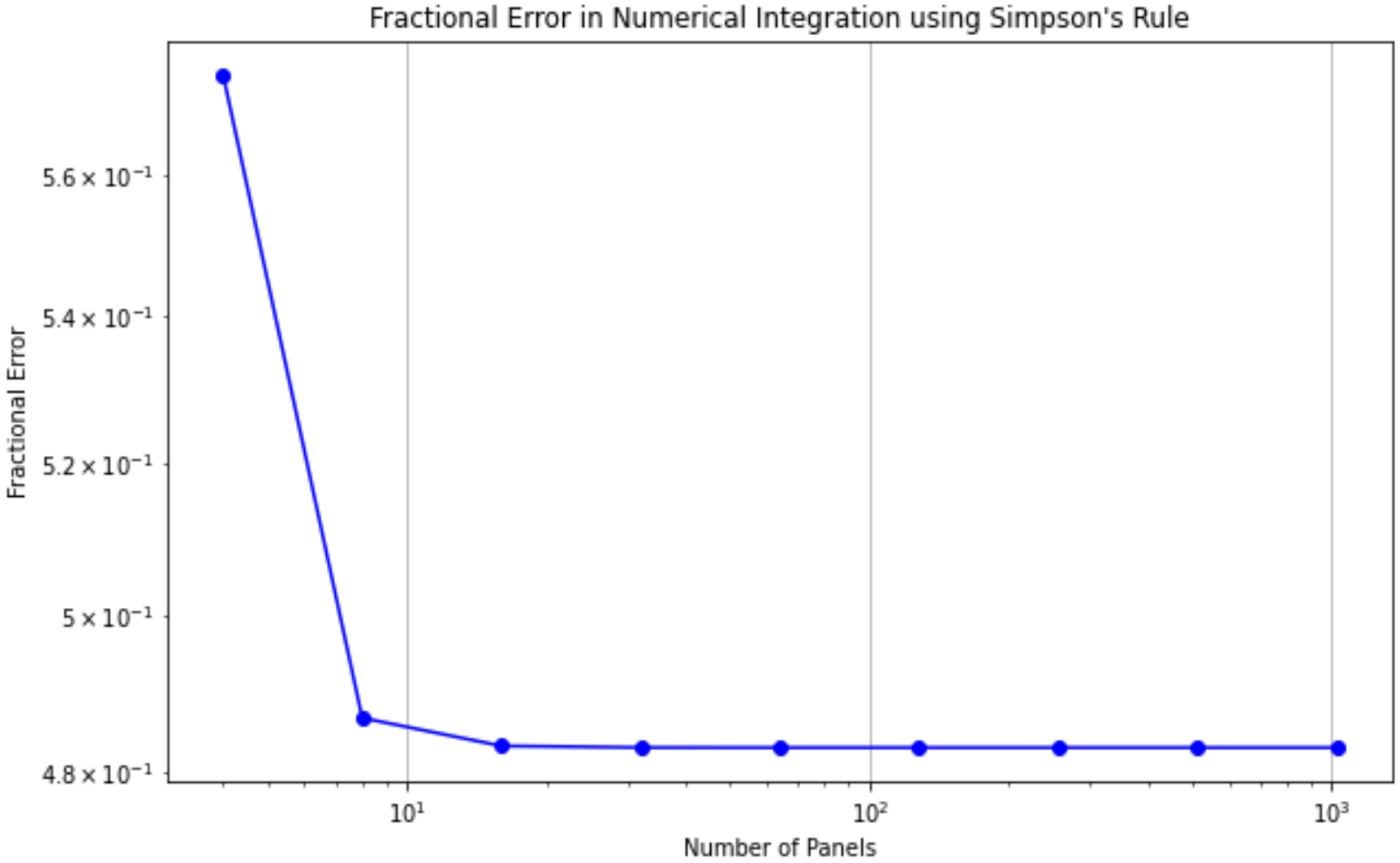
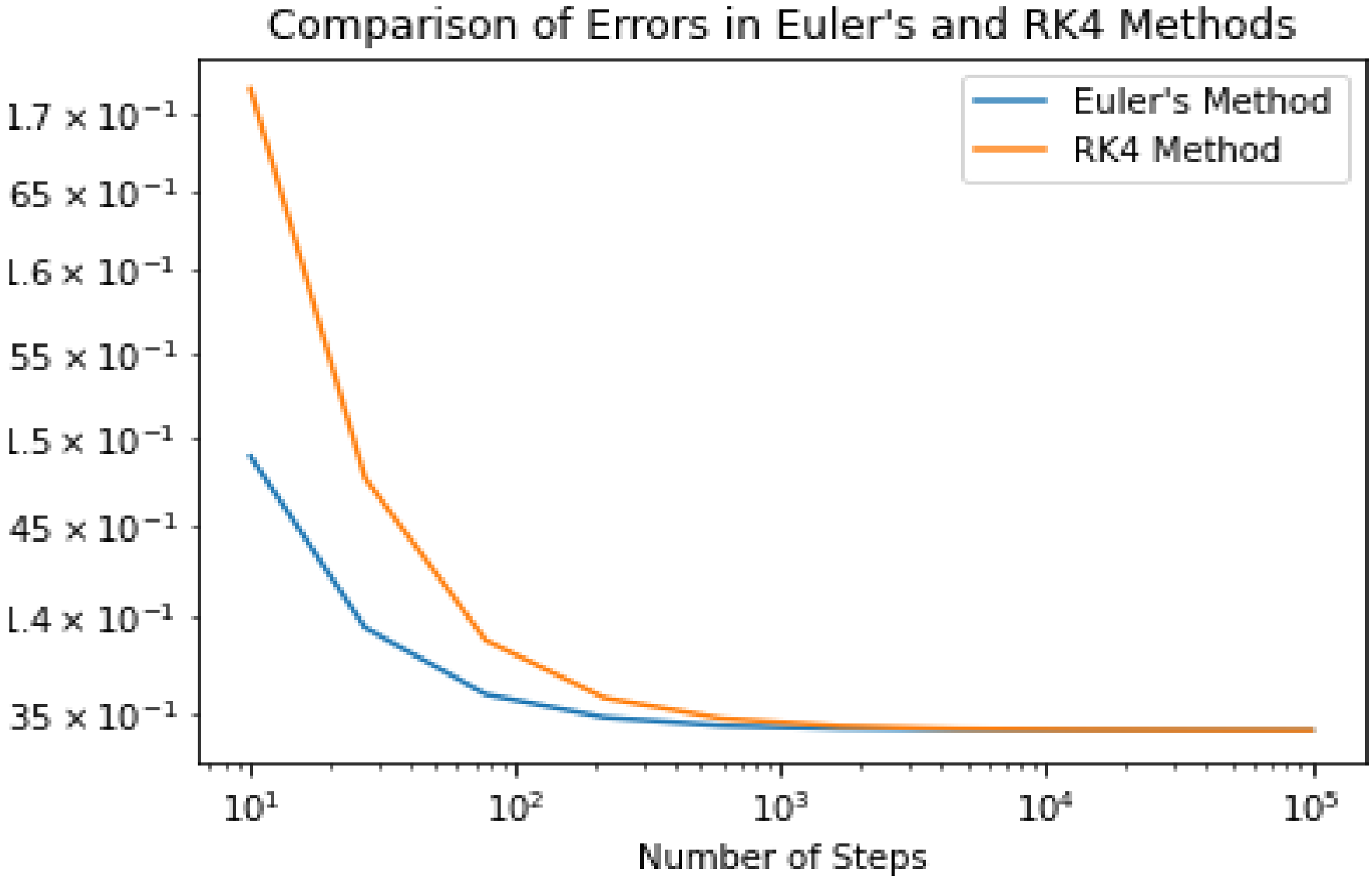
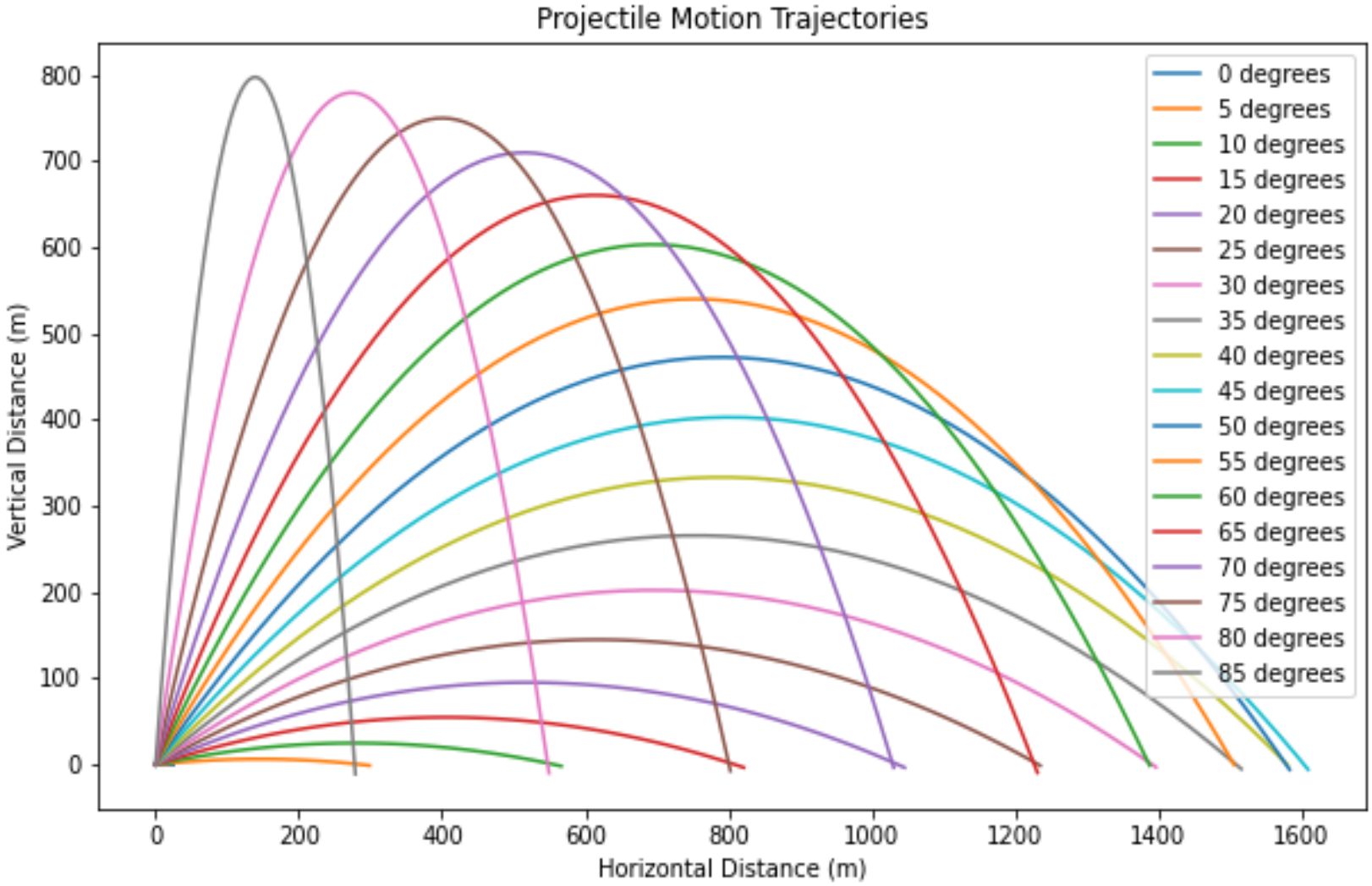
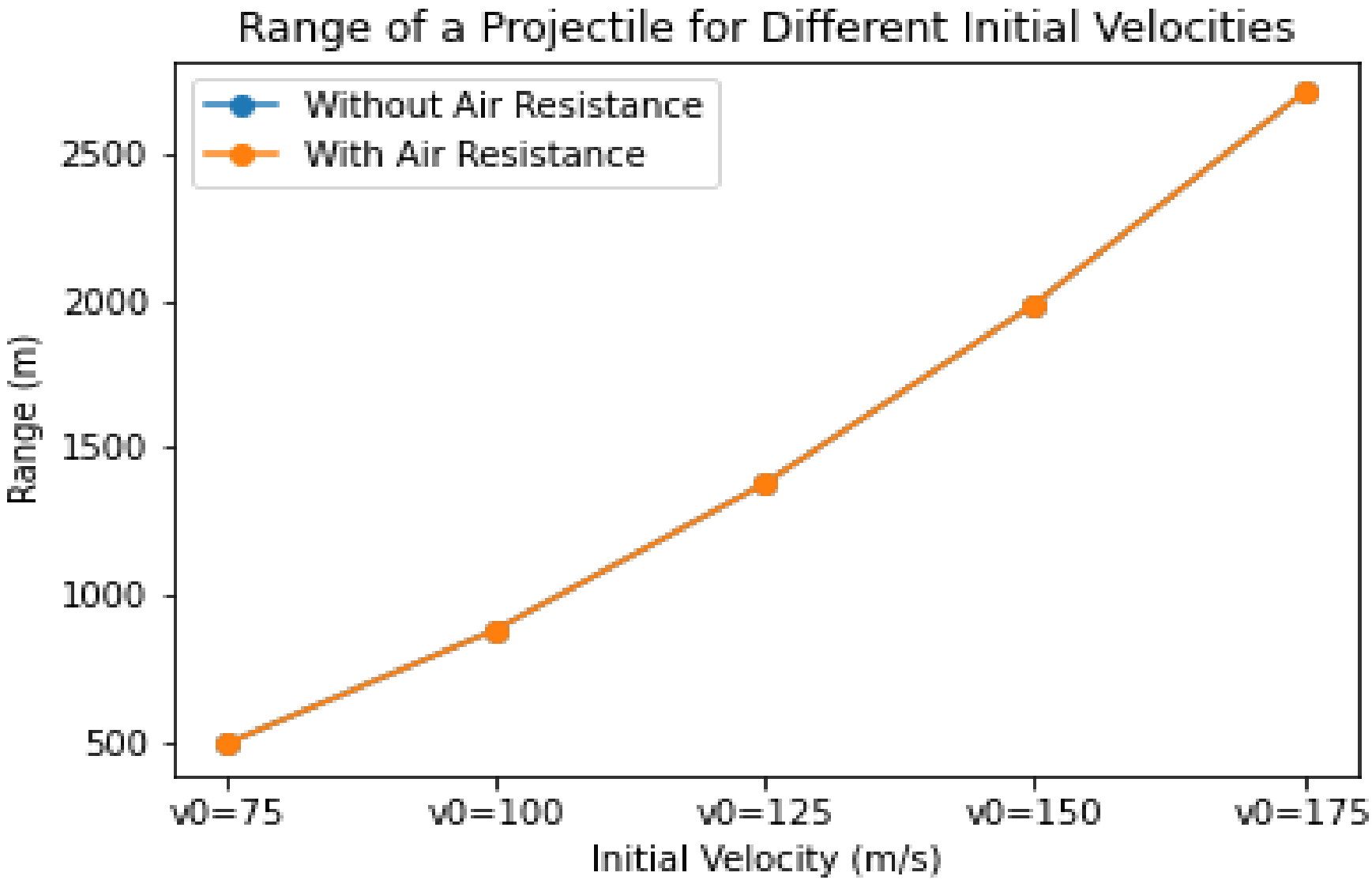
14319

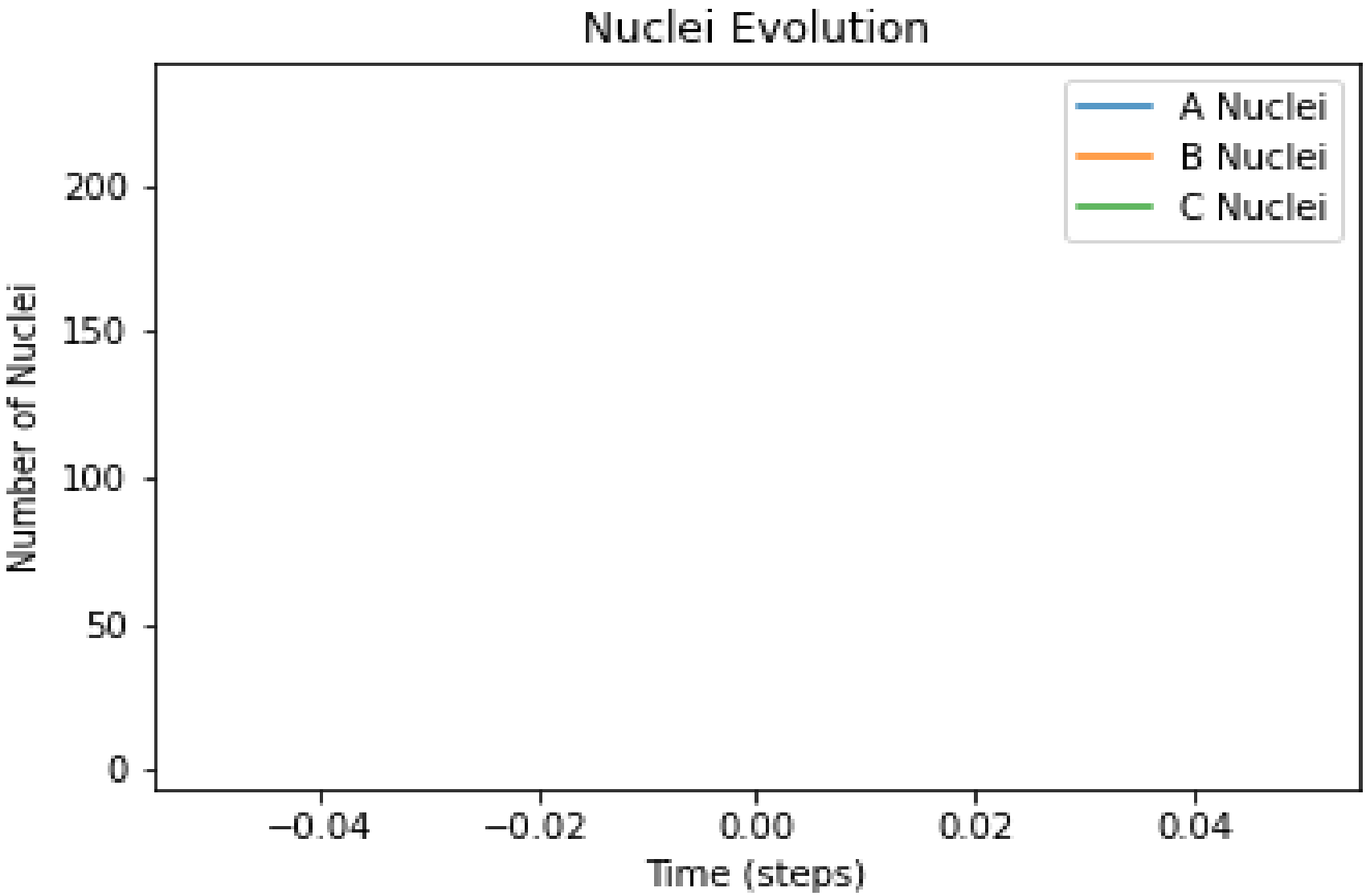

Comparison of Analytical and Numerical Derivatives
Derivative
x
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
−4
−2
0
2
4

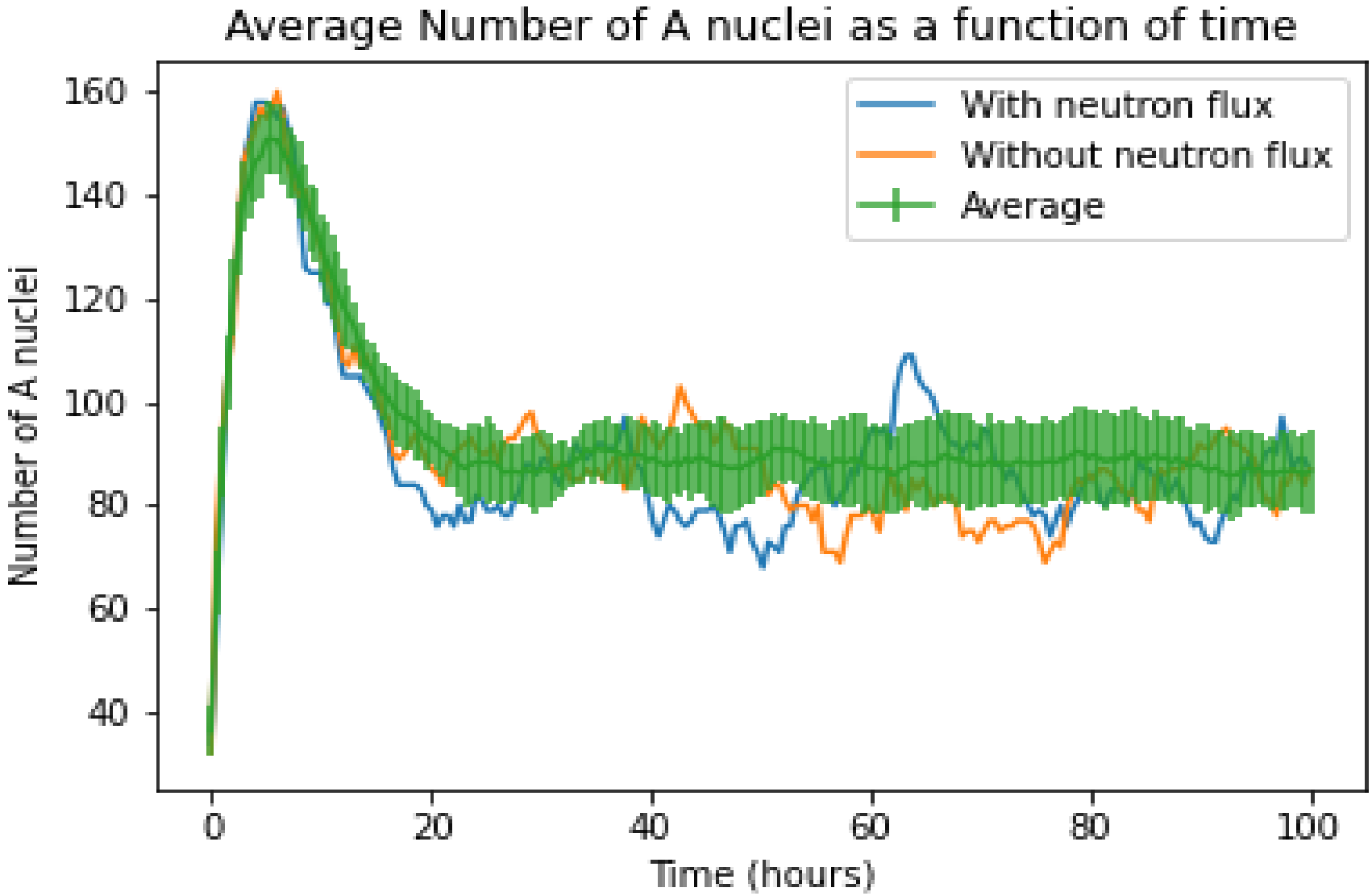

Fractional Error in Numerical Integration using Simpson's Rule
Fractional Error
5.6×10^{-1}
5.4×10^{-1}
5.2×10^{-1}
5×10^{-1}
4.8×10^{-1}
10^{1}
10^{2}
10^{3}
Number of Panels

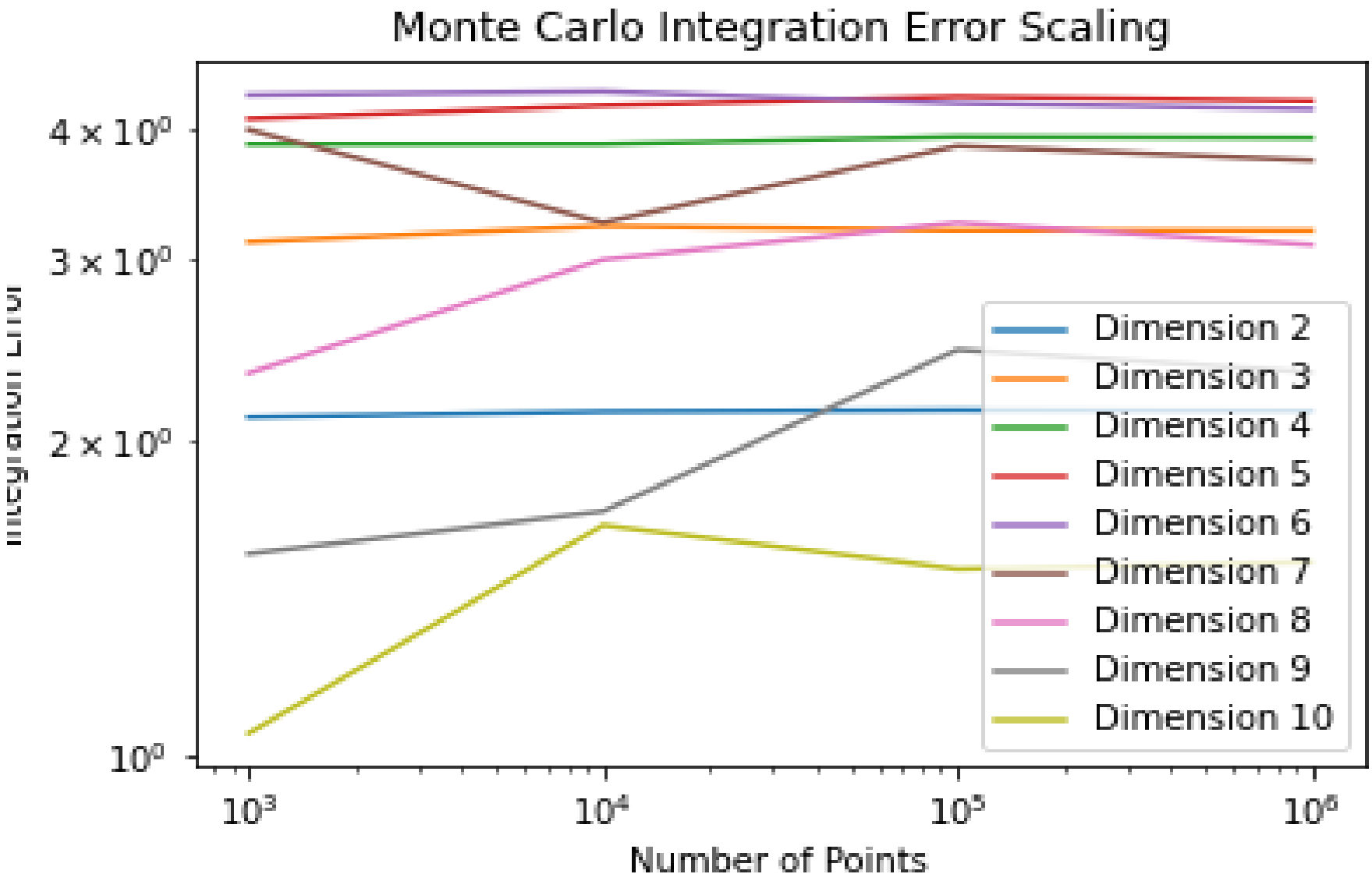

Comparison of Errors in Euler's and RK4 Methods
Euler's Method
RK4 Method
1.7 × 10⁻¹
65 × 10⁻¹
1.6 × 10⁻¹
55 × 10⁻¹
1.5 × 10⁻¹
45 × 10⁻¹
1.4 × 10⁻¹
35 × 10⁻¹
10¹
10²
10³
10⁴
10⁵
Number of Steps

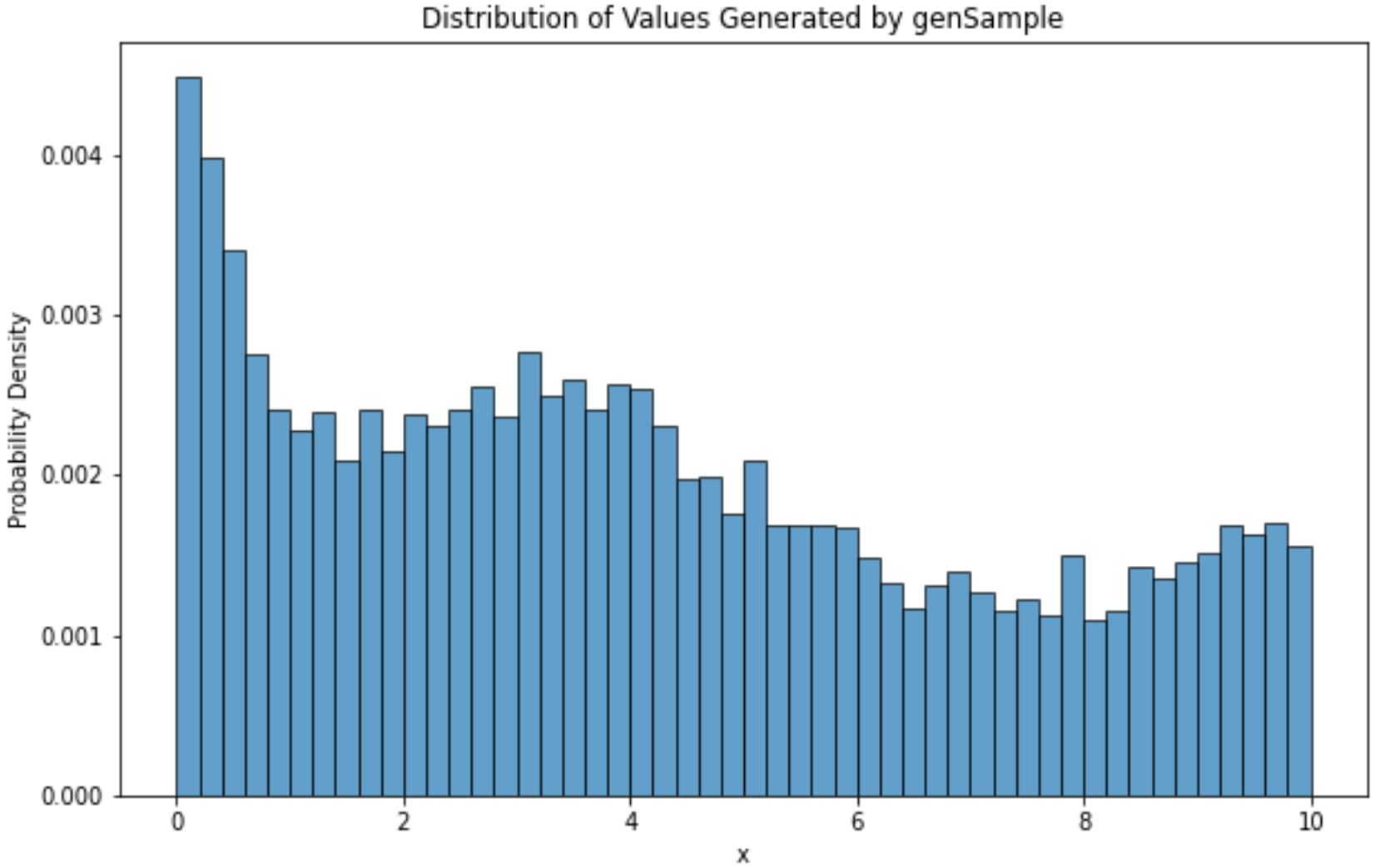

Projectile Motion Trajectories
Vertical Distance (m)
Horizontal Distance (m)
0
100
200
300
400
500
600
700
800
0
200
400
600
800
1000
1200
1400
1600
0 degrees
5 degrees
10 degrees
15 degrees
20 degrees
25 degrees
30 degrees
35 degrees
40 degrees
45 degrees
50 degrees
55 degrees
60 degrees
65 degrees
70 degrees
75 degrees
80 degrees
85 degrees

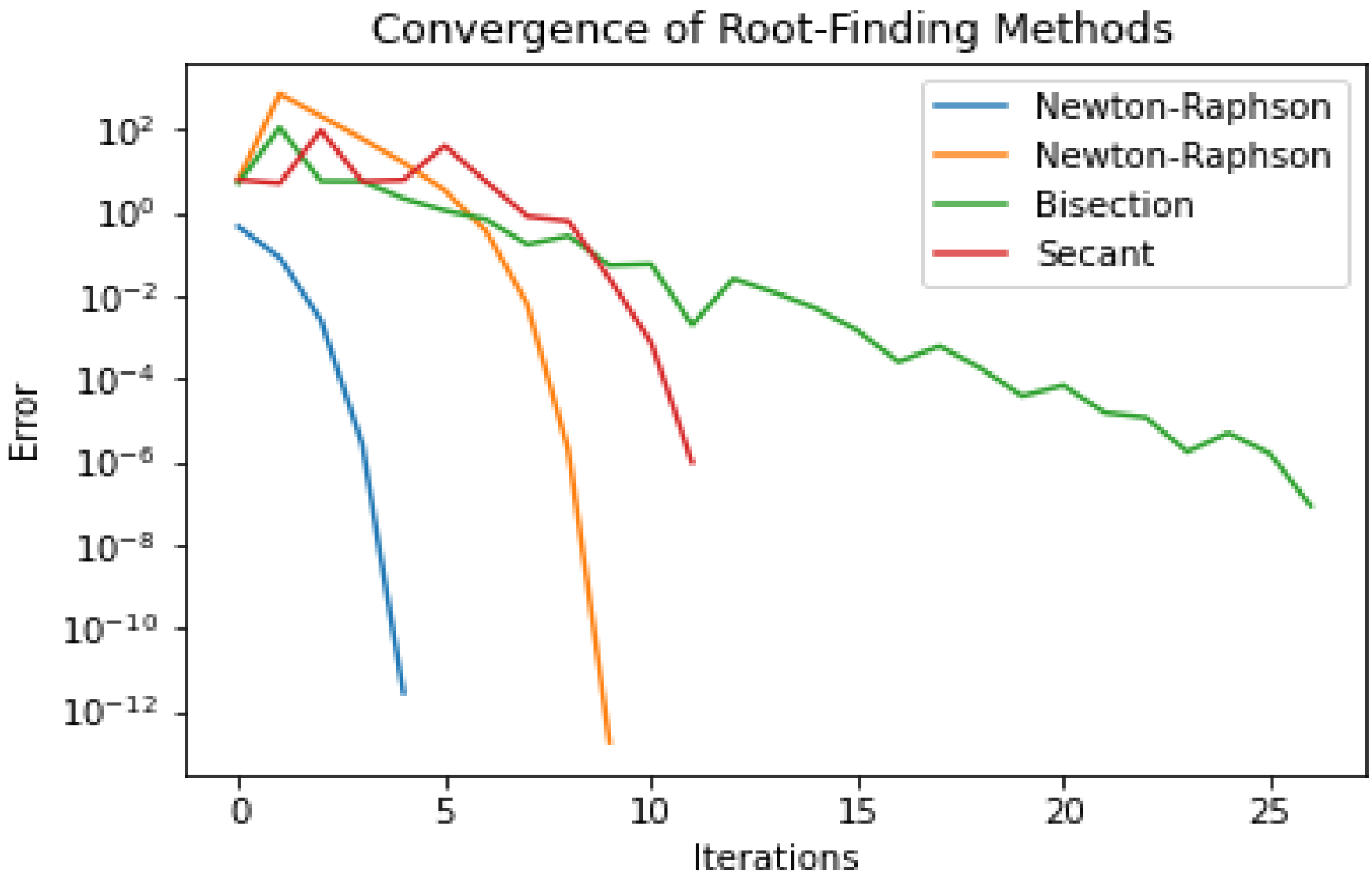

Range of a Projectile for Different Initial Velocities
Without Air Resistance
With Air Resistance
2500
2000
1500
1000
500
Range (m)
v0=75
v0=100
v0=125
v0=150
v0=175
Initial Velocity (m/s)

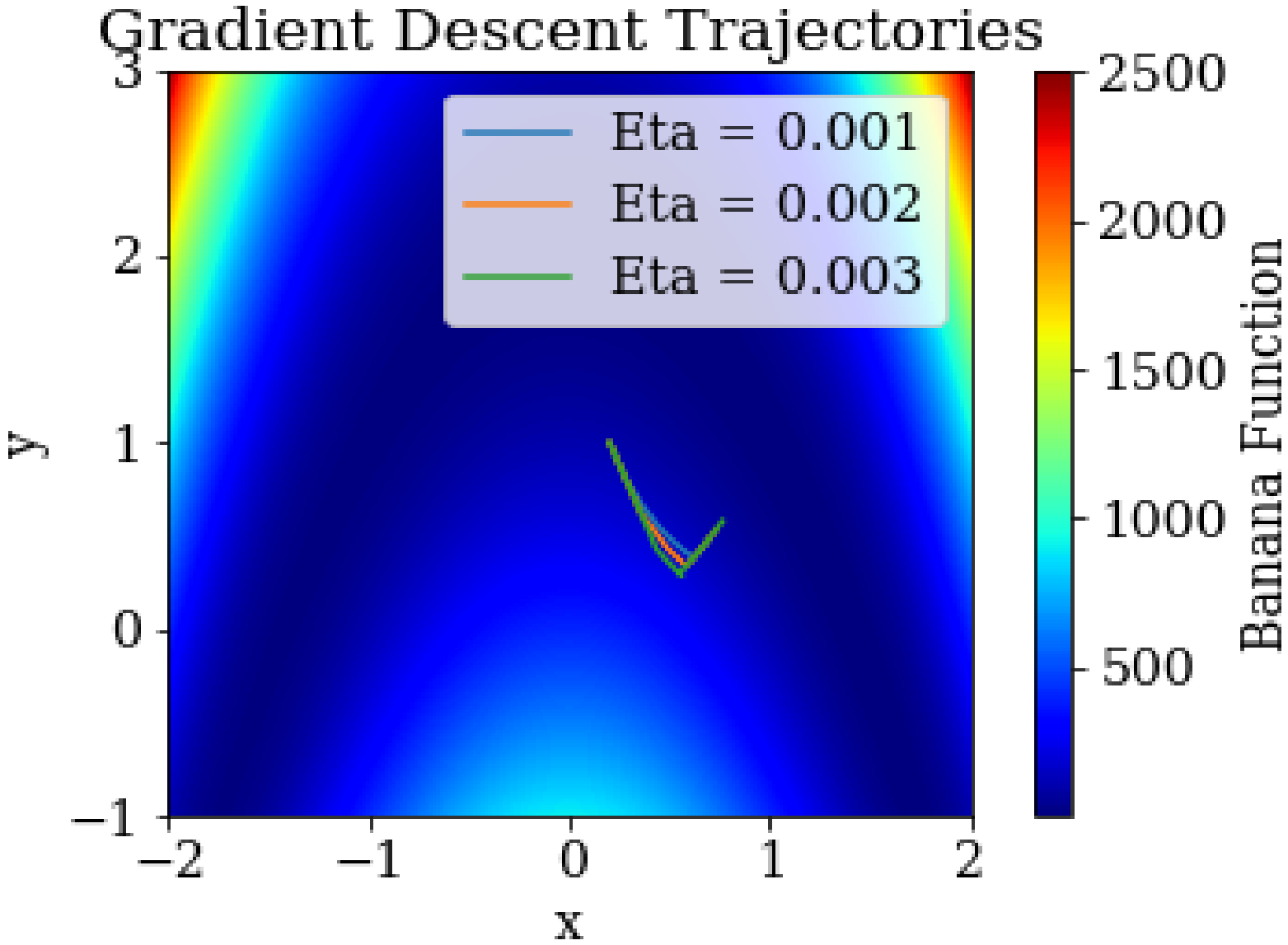

Nuclei Evolution
A Nuclei
B Nuclei
C Nuclei
Number of Nuclei
200
150
100
50
0
−0.04
−0.02
0.00
0.02
0.04
Time (steps)

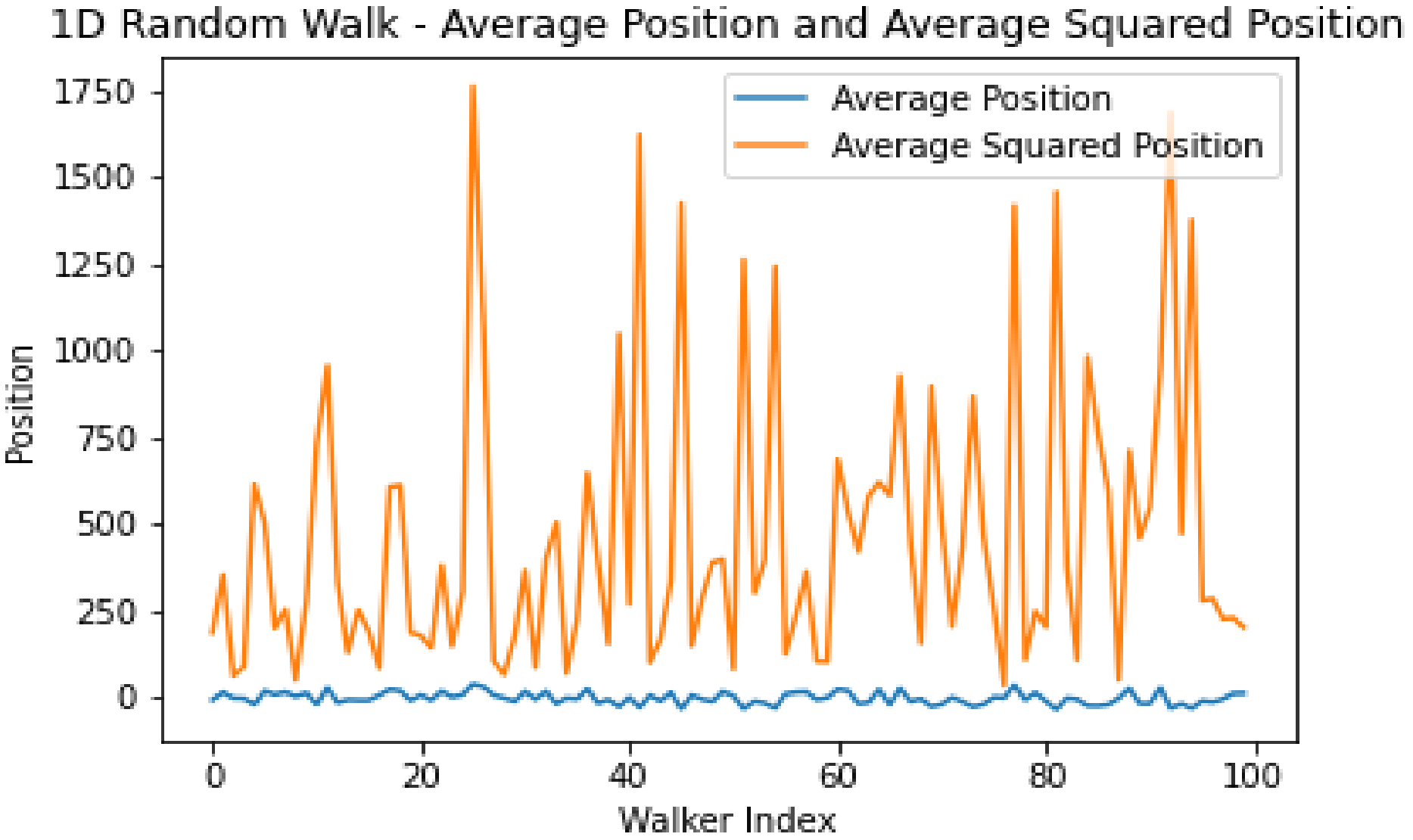

Average Number of A nuclei as a function of time
With neutron flux
Without neutron flux
Average
Number of A nuclei
Time (hours)
160
140
120
100
80
60
40
0
20
40
60
80
100

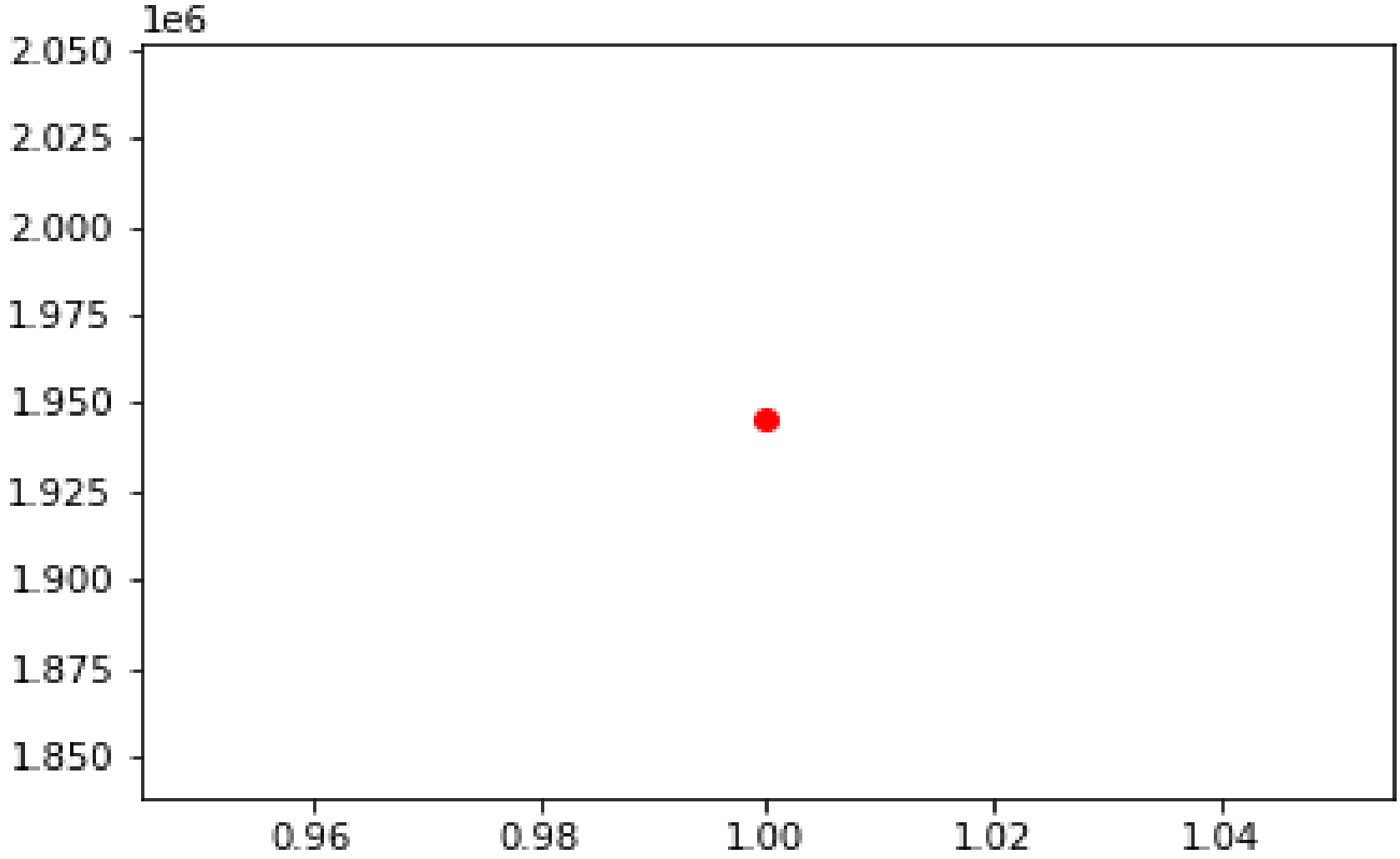

Monte Carlo Integration Error Scaling
Integration Error
4×10^0
3×10^0
2×10^0
10^0
10^3
10^4
10^5
10^6
Number of Points
Dimension 2
Dimension 3
Dimension 4
Dimension 5
Dimension 6
Dimension 7
Dimension 8
Dimension 9
Dimension 10

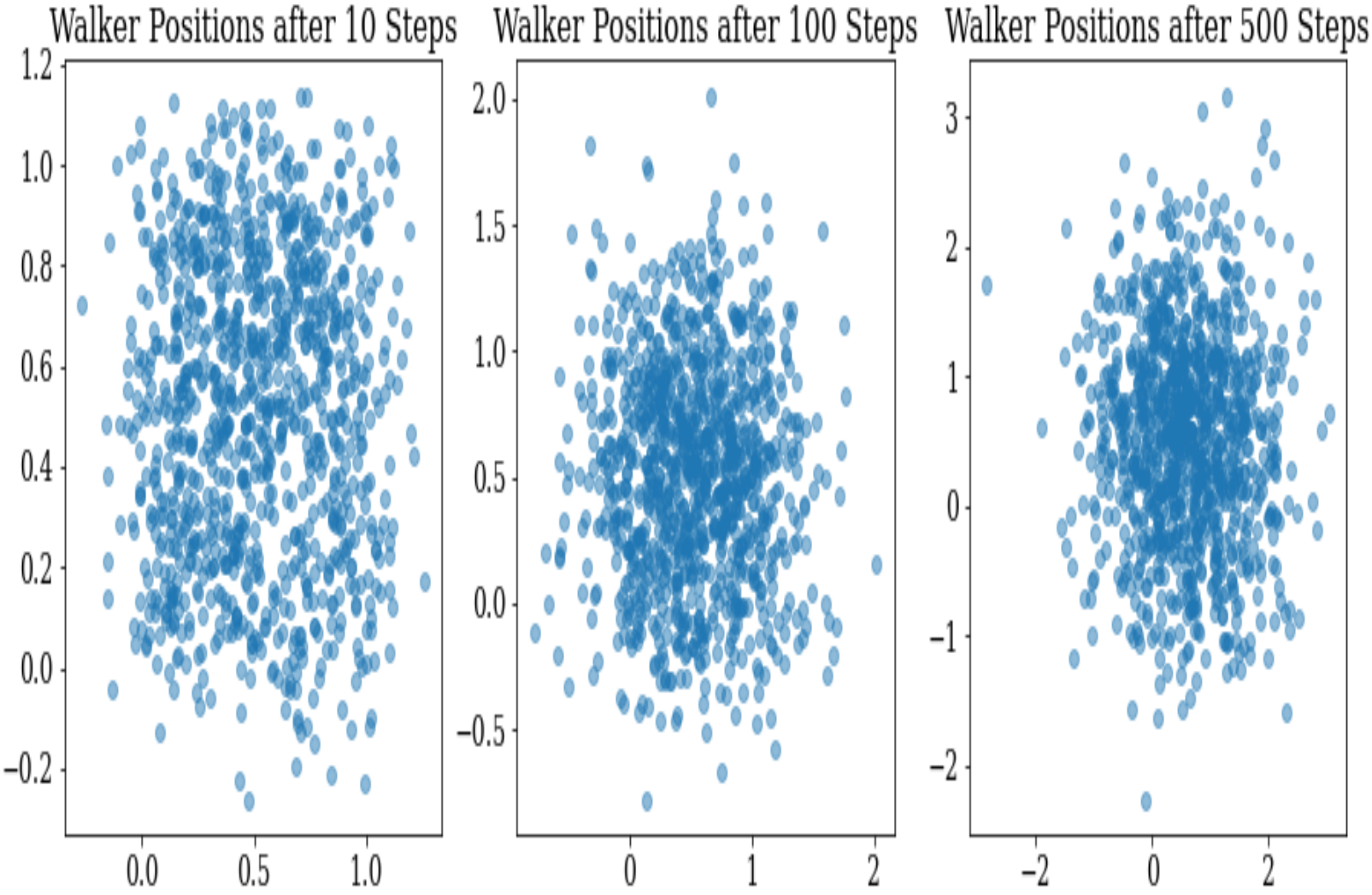

Distribution of Values Generated by genSample
Probability Density
0.000
0.001
0.002
0.003
0.004
0
2
4
6
8
10
x


Convergence of Root-Finding Methods
Newton-Raphson
Newton-Raphson
Bisection
Secant
Error
10^{2}
10^{0}
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{-12}
0
5
10
15
20
25
Iterations


Gradient Descent Trajectories
Eta = 0.001
Eta = 0.002
Eta = 0.003
3
2
1
0
−1
y
−2
−1
0
1
2
x
2500
2000
1500
1000
500
Banana Function


1D Random Walk - Average Position and Average Squared Position
Average Position
Average Squared Position
Position
Walker Index
0
250
500
750
1000
1250
1500
1750
0
20
40
60
80
100


1e6
2.050
2.025
2.000
1.975
1.950
1.925
1.900
1.875
1.850
0.96
0.98
1.00
1.02
1.04


Walker Positions after 10 Steps
Walker Positions after 100 Steps
Walker Positions after 500 Steps
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
0.0
0.5
1.0
2.0
1.5
1.0
0.5
0.0
−0.5
0
1
2
3
2
1
0
−1
−2
−2
0
2

AI?