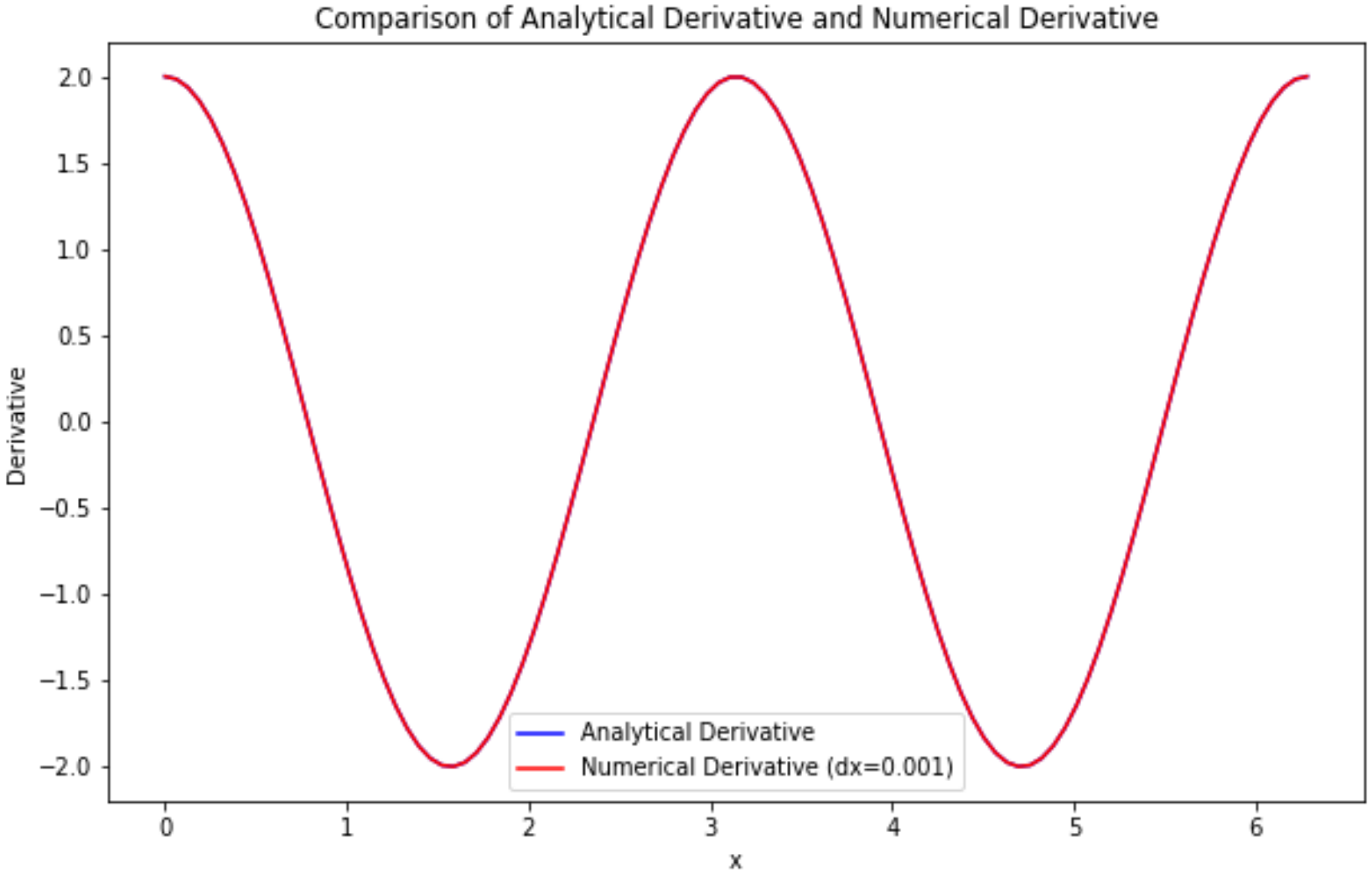
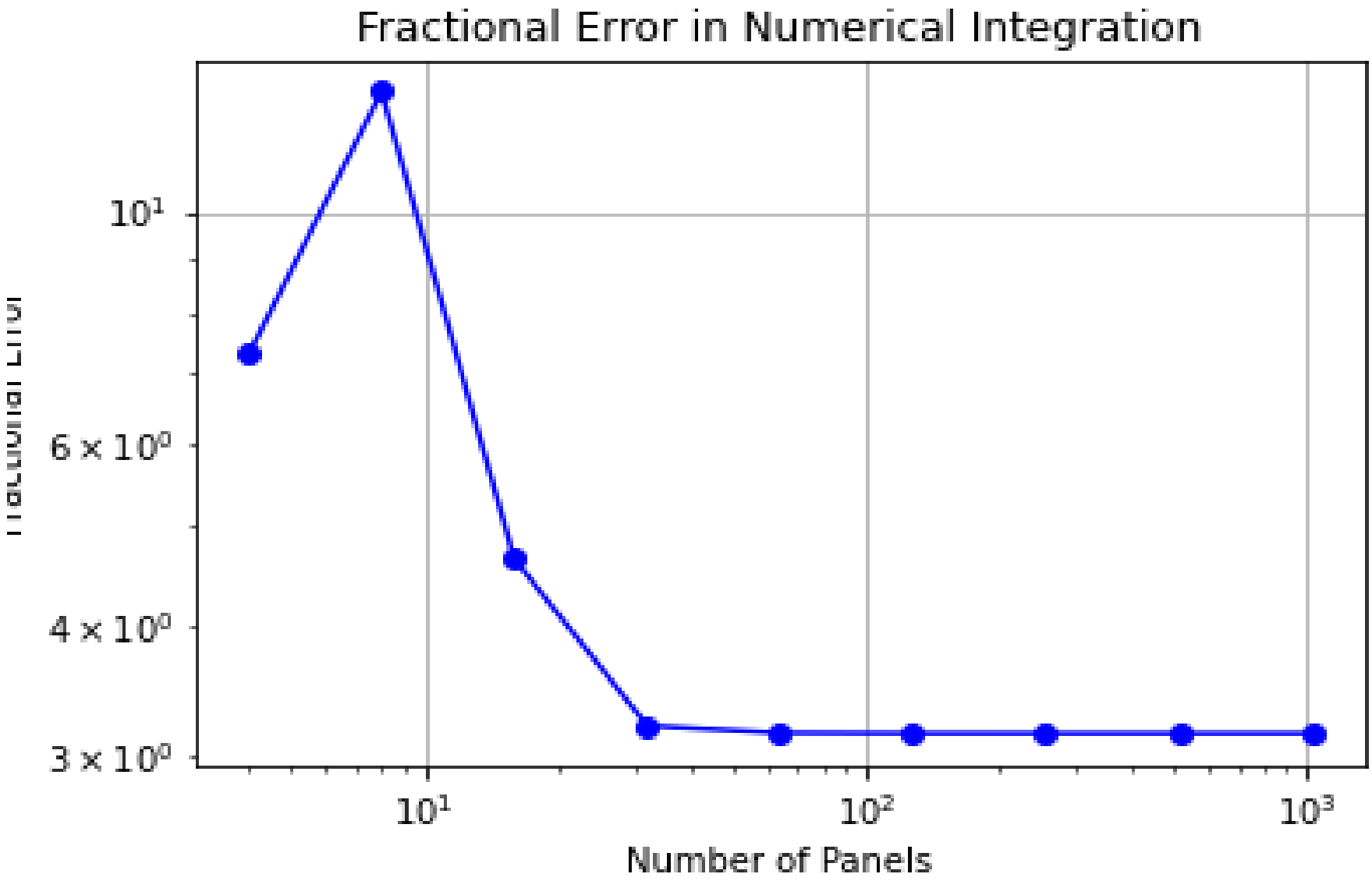
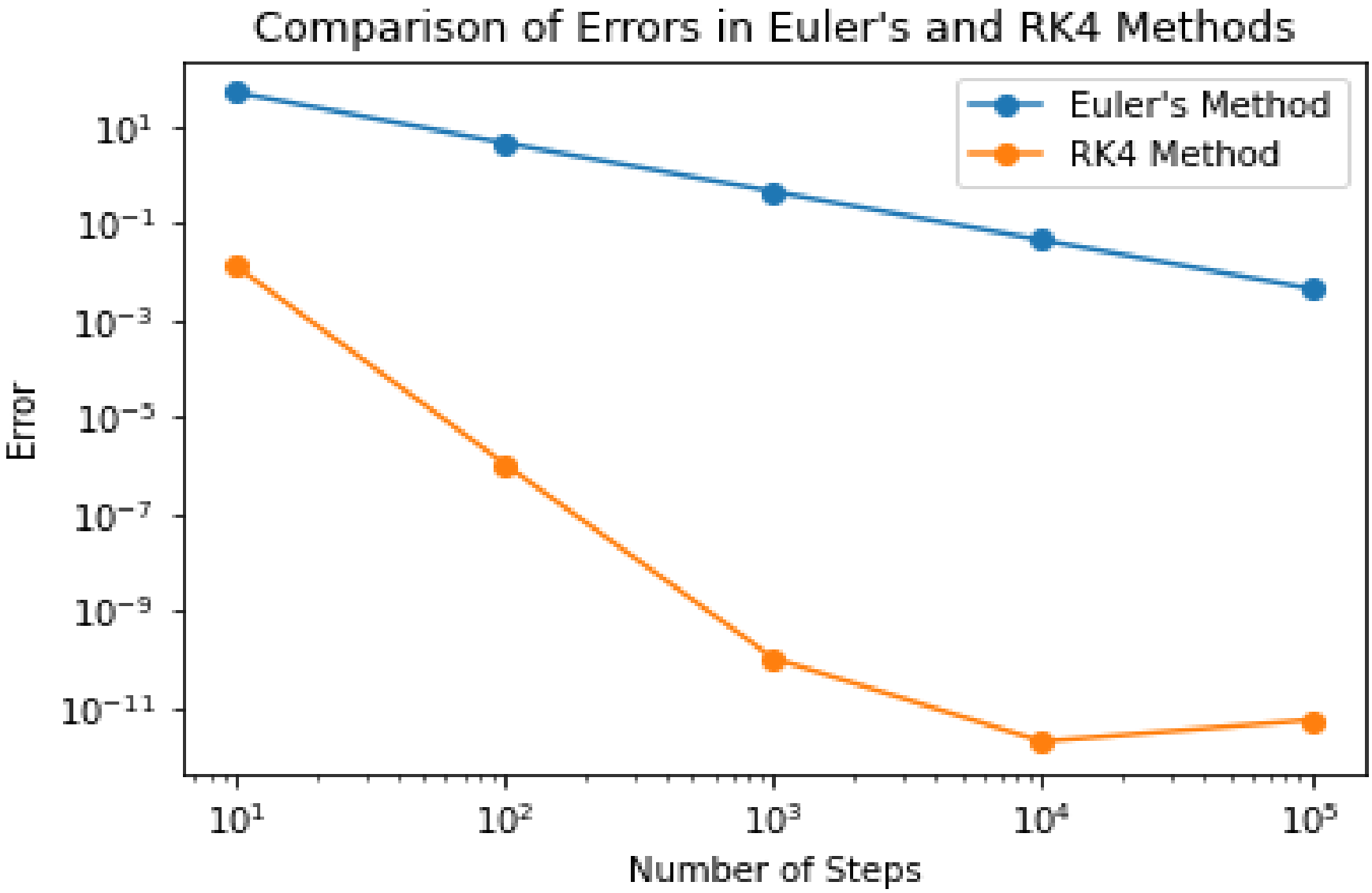
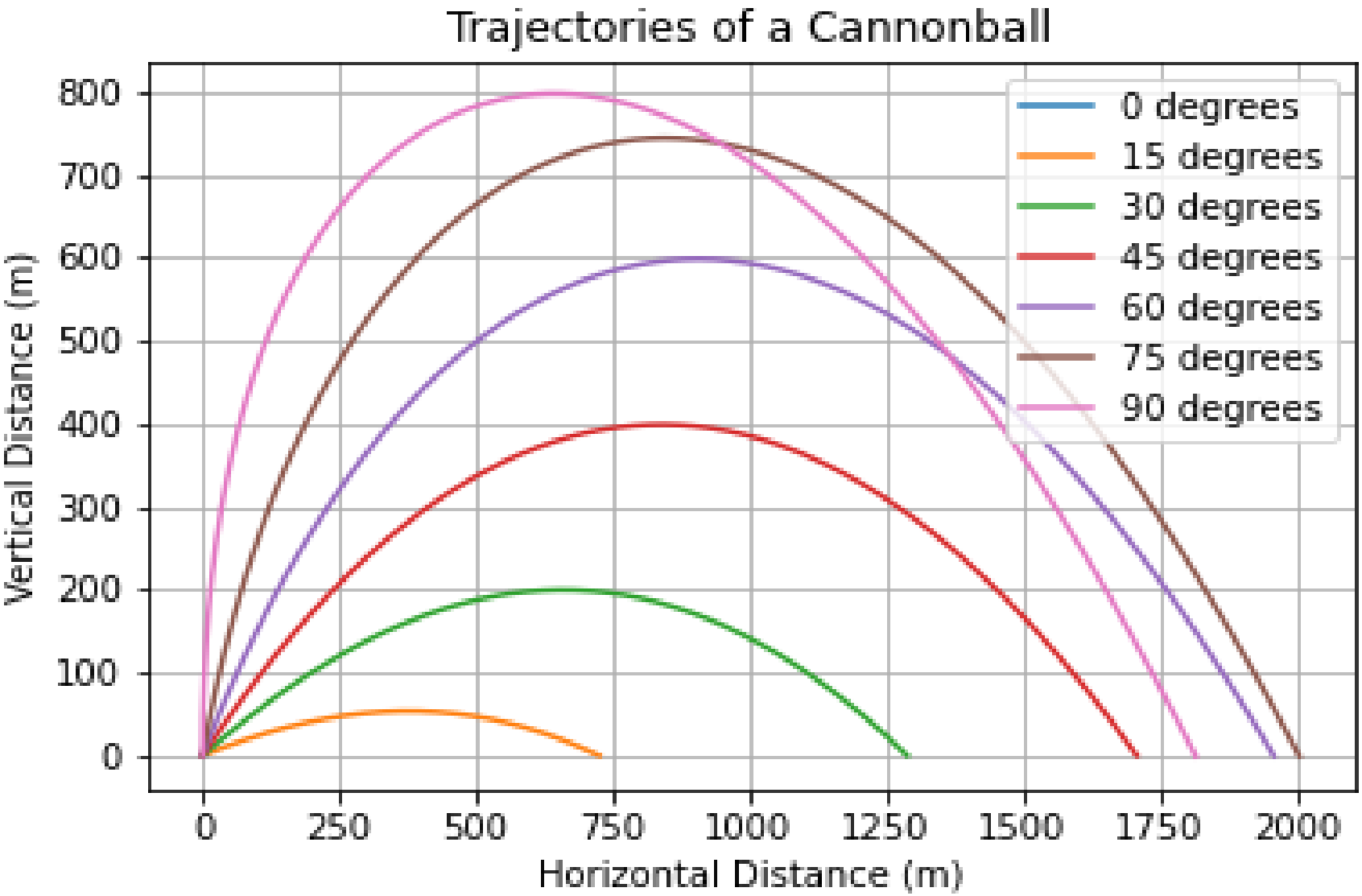
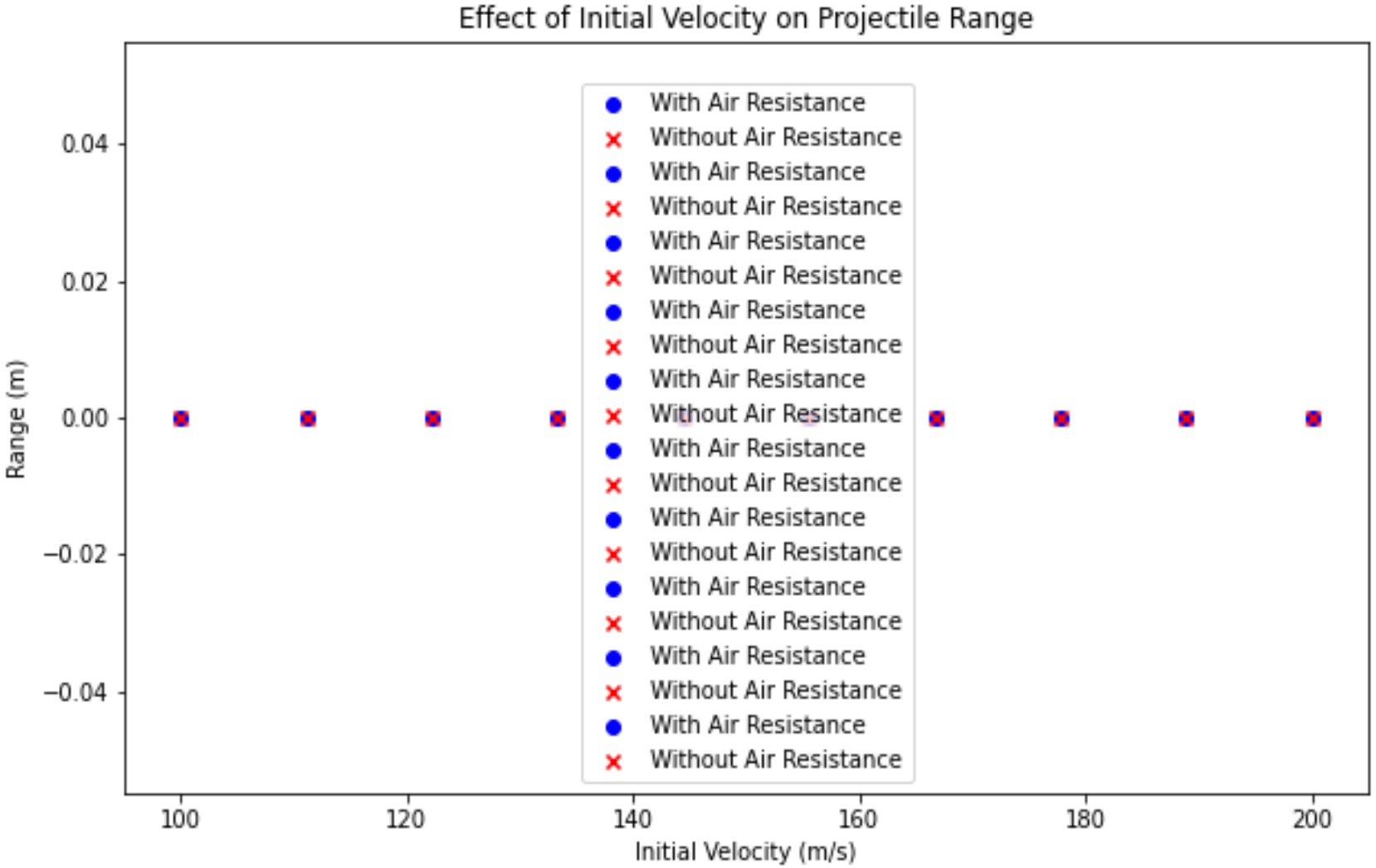
86938

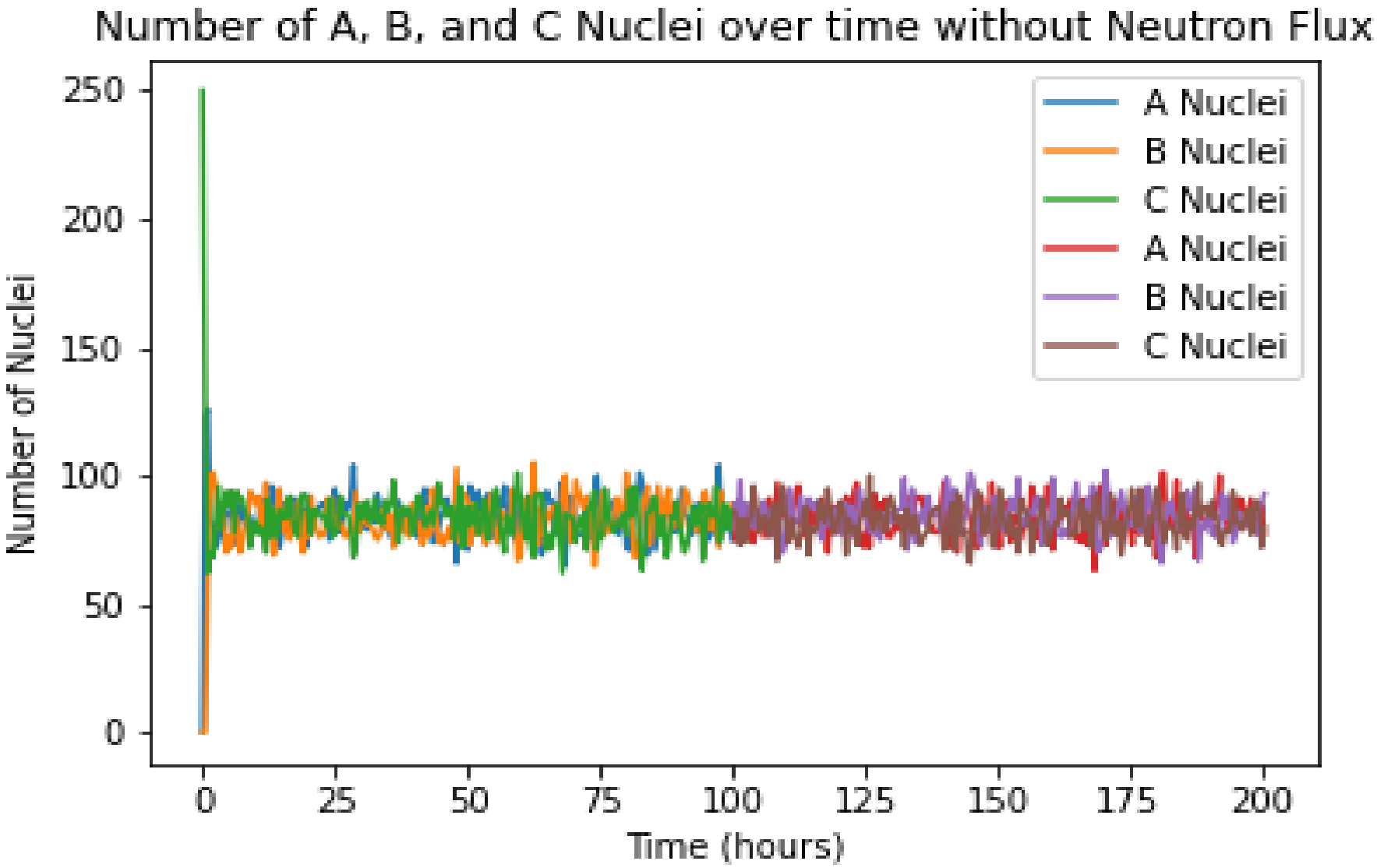

Comparison of Analytical Derivative and Numerical Derivative
Derivative
x
Analytical Derivative
Numerical Derivative (dx=0.001)
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0
1
2
3
4
5
6

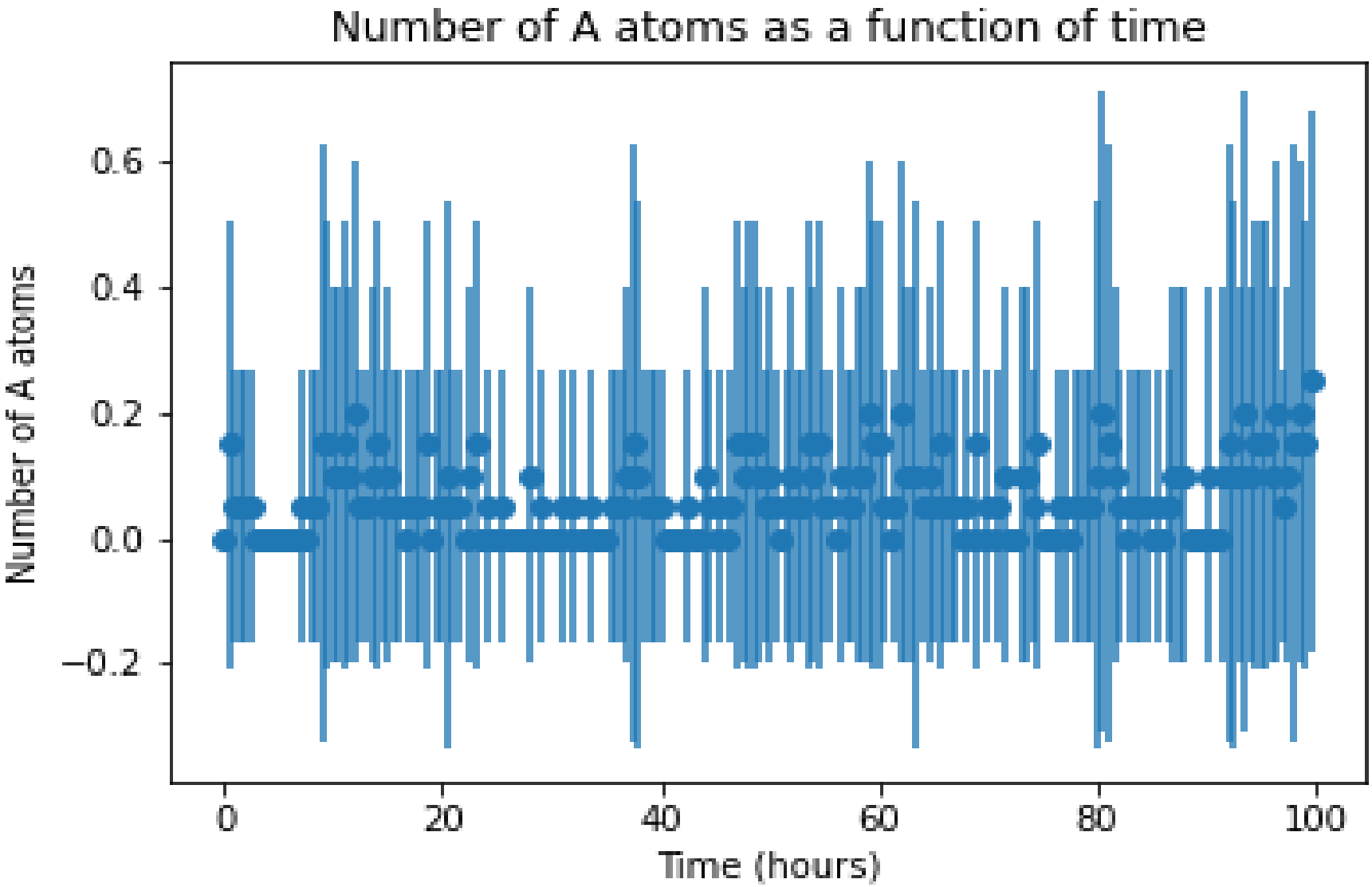

Fractional Error in Numerical Integration
10^1
6×10^0
4×10^0
3×10^0
10^1
10^2
10^3
Number of Panels

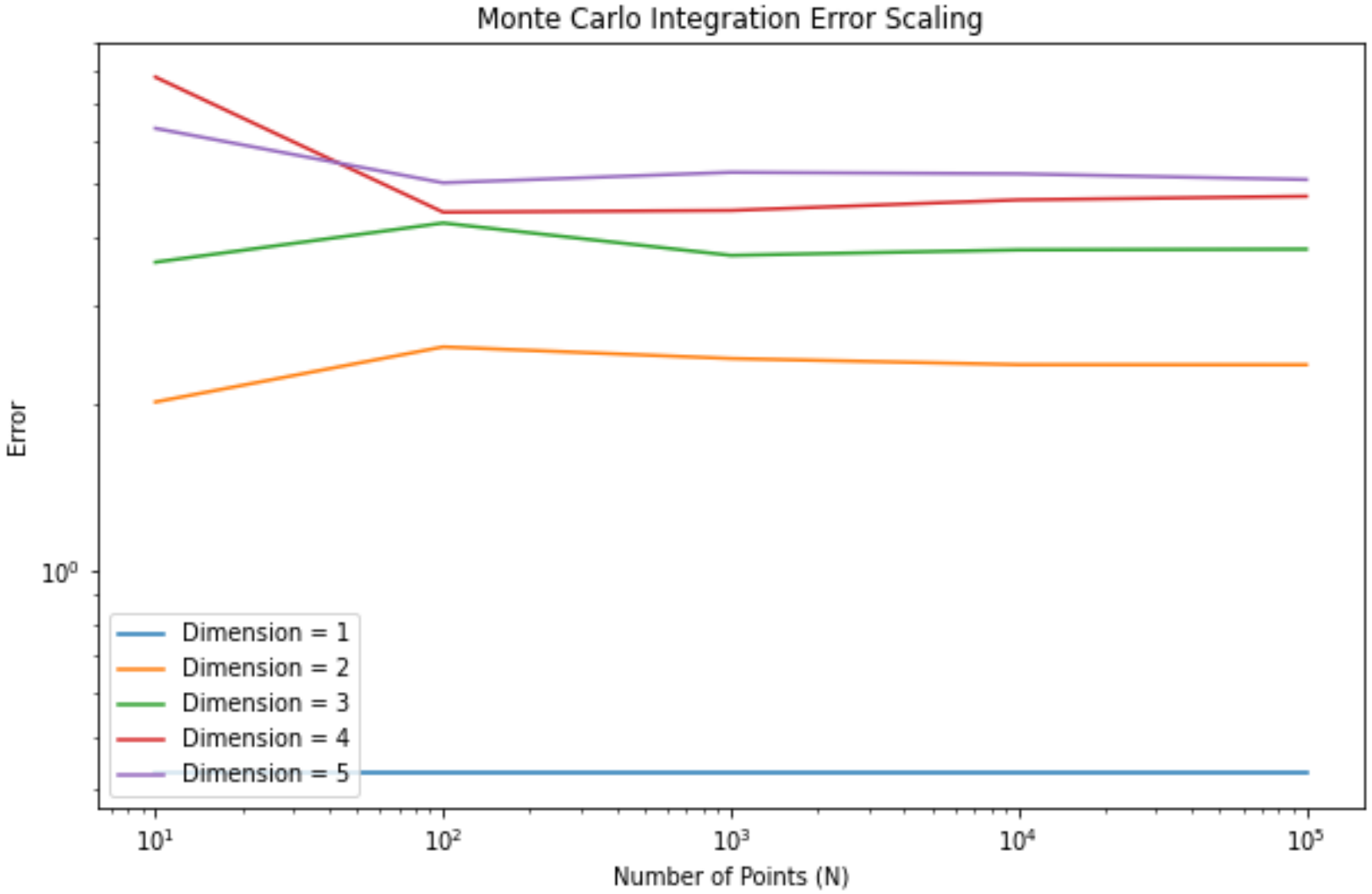

Comparison of Errors in Euler's and RK4 Methods
Euler's Method
RK4 Method
Error
10^{1}
10^{-1}
10^{-3}
10^{-5}
10^{-7}
10^{-9}
10^{-11}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Number of Steps

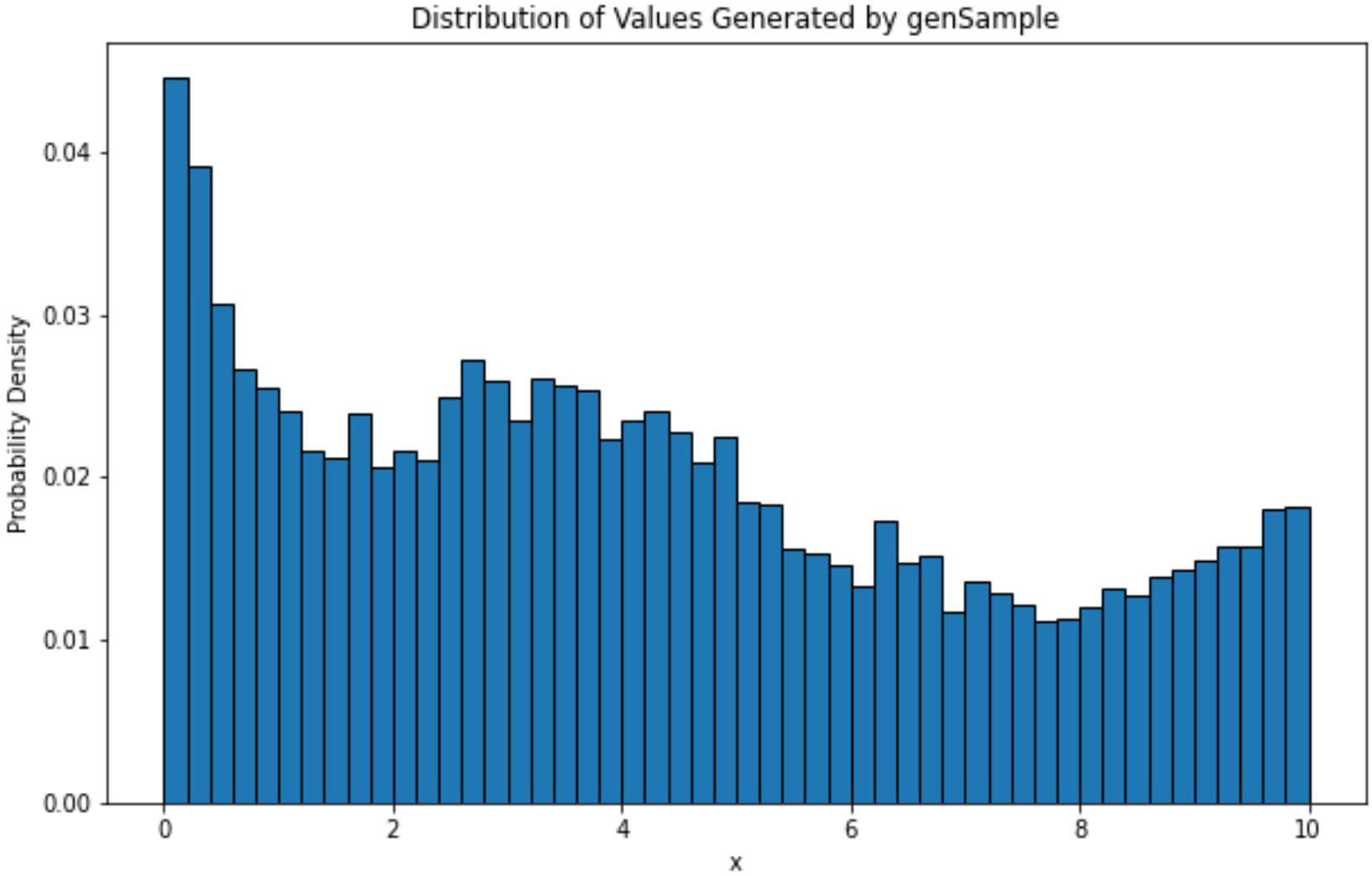

Trajectories of a Cannonball
Vertical Distance (m)
Horizontal Distance (m)
0
100
200
300
400
500
600
700
800
0
250
500
750
1000
1250
1500
1750
2000
0 degrees
15 degrees
30 degrees
45 degrees
60 degrees
75 degrees
90 degrees

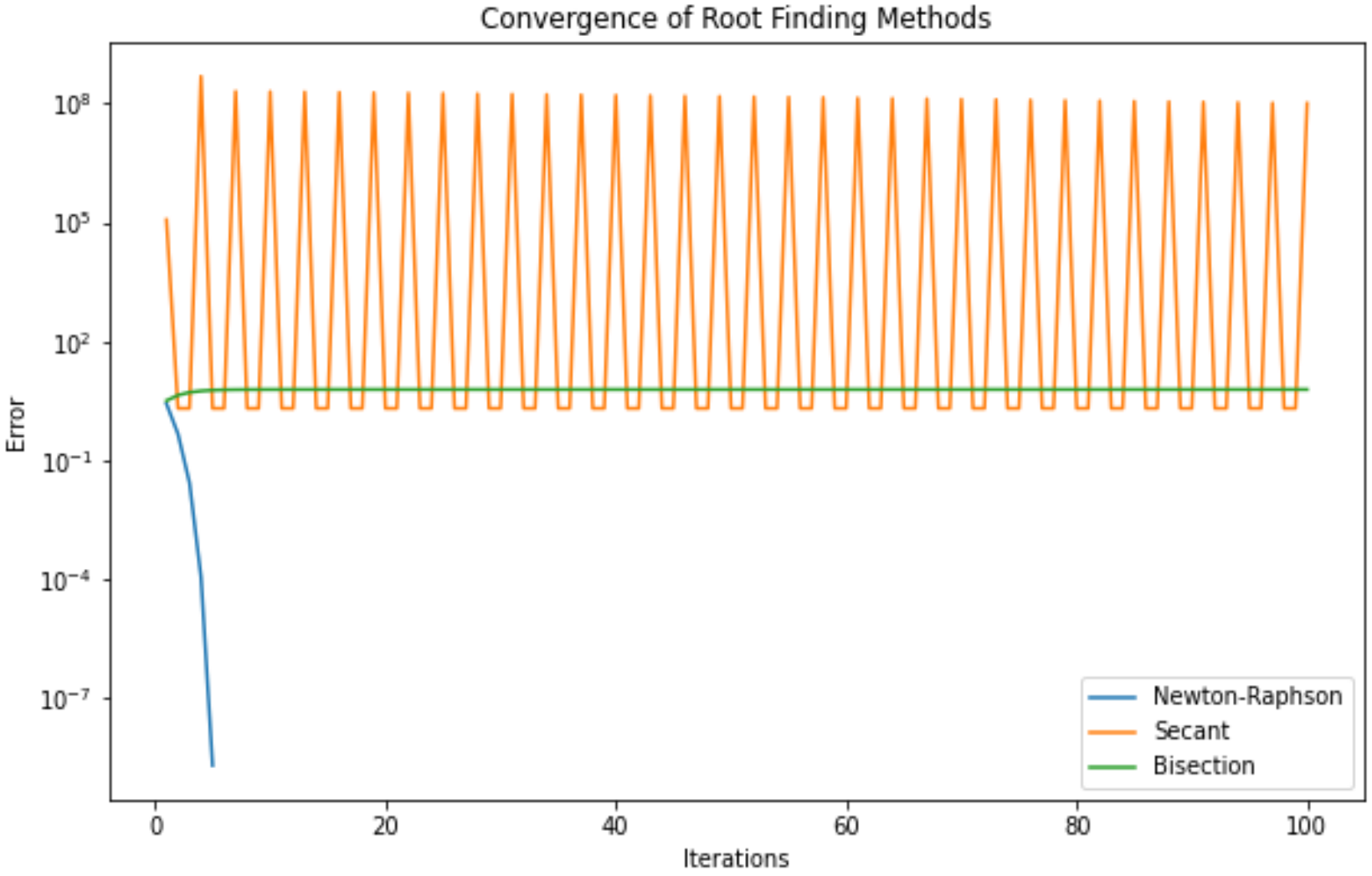

Effect of Initial Velocity on Projectile Range
With Air Resistance
Without Air Resistance
Range (m)
0.04
0.02
0.00
−0.02
−0.04
100
120
140
160
180
200
Initial Velocity (m/s)

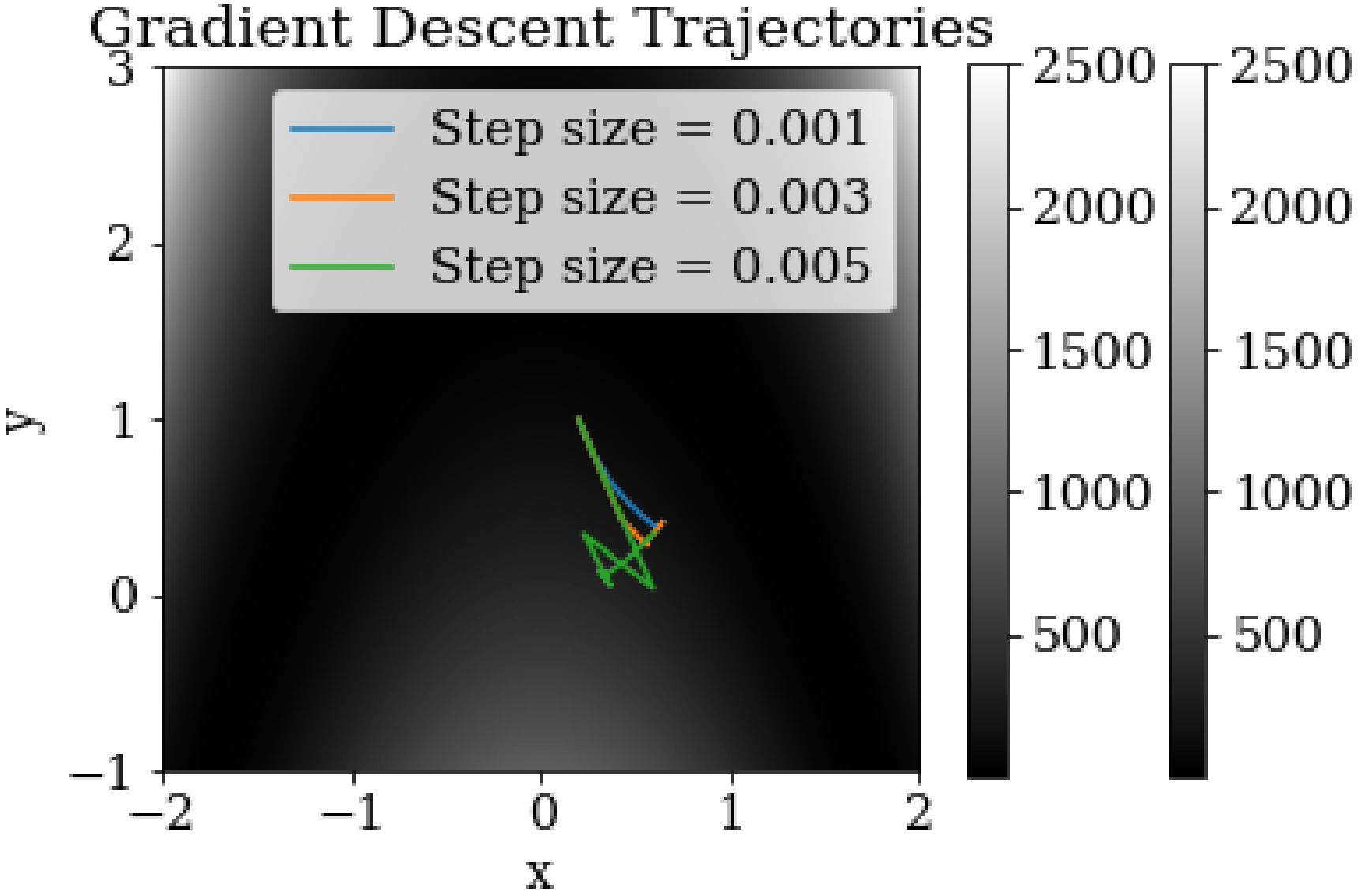

Number of A, B, and C Nuclei over time without Neutron Flux
Number of Nuclei
Time (hours)
A Nuclei
B Nuclei
C Nuclei
A Nuclei
B Nuclei
C Nuclei
250
200
150
100
50
0
0
25
50
75
100
125
150
175
200

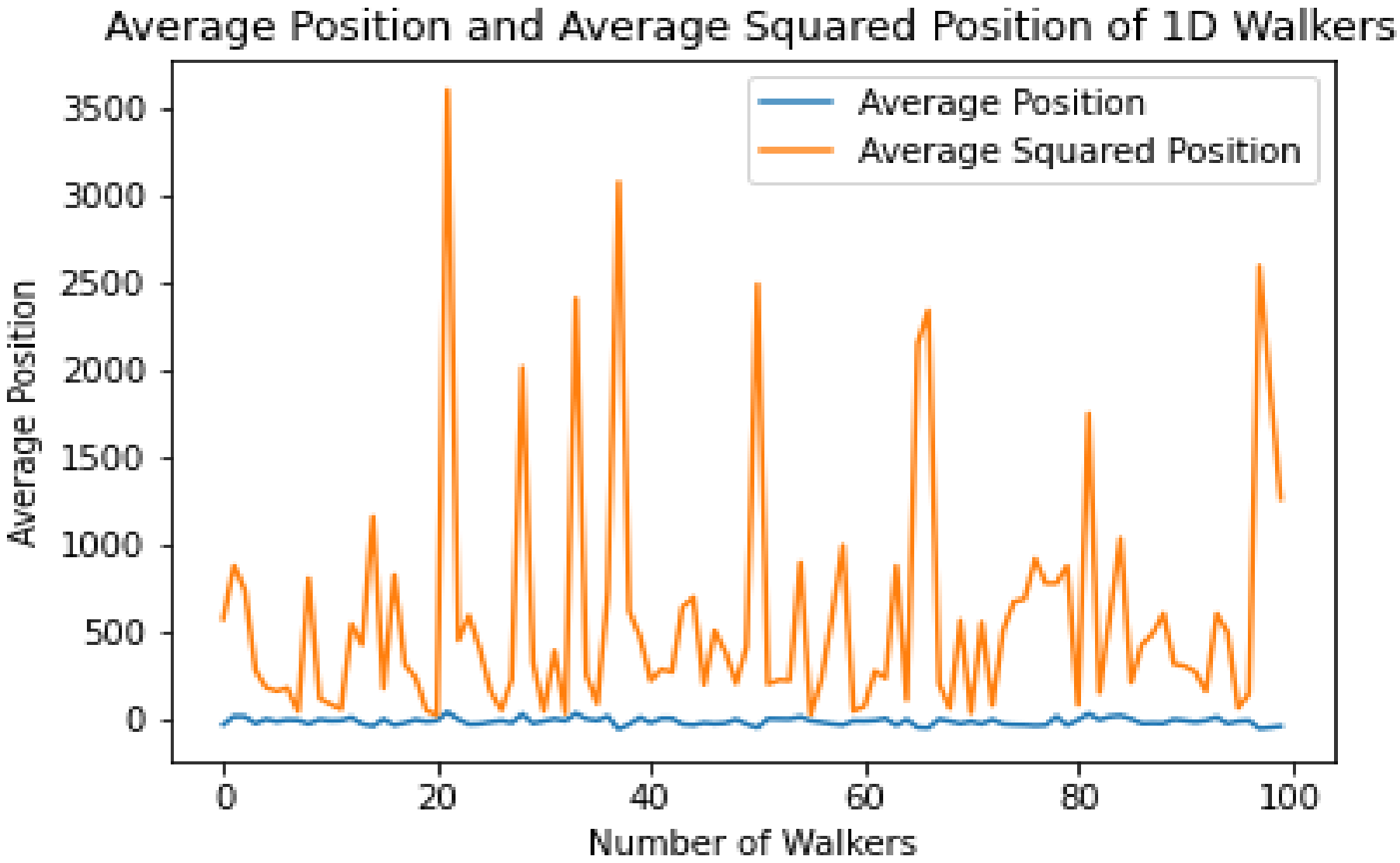

Number of A atoms as a function of time
Number of A atoms
0.6
0.4
0.2
0.0
−0.2
0
20
40
60
80
100
Time (hours)

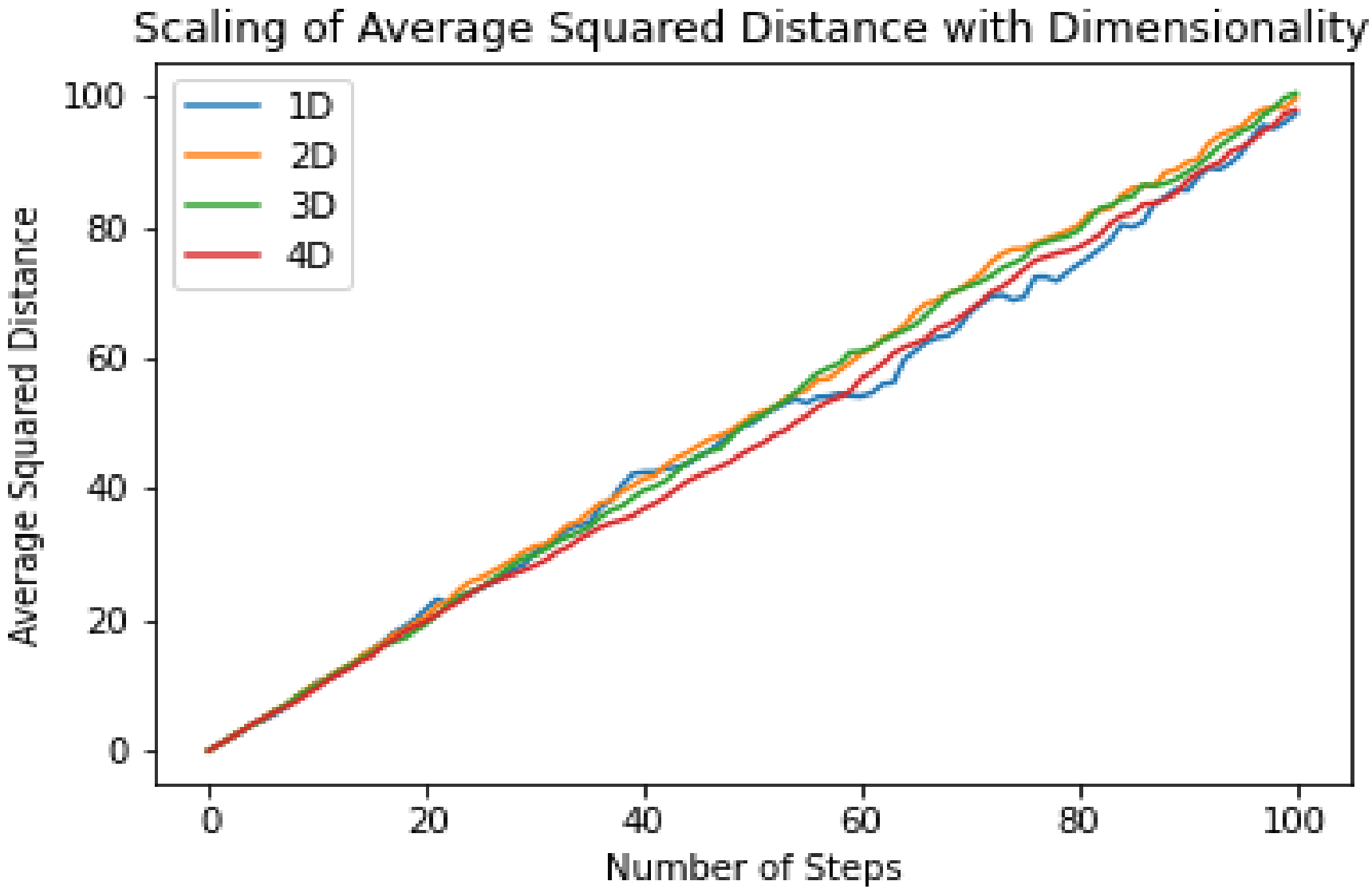

Monte Carlo Integration Error Scaling
Error
10^0
Dimension = 1
Dimension = 2
Dimension = 3
Dimension = 4
Dimension = 5
10^1
10^2
10^3
10^4
10^5
Number of Points (N)

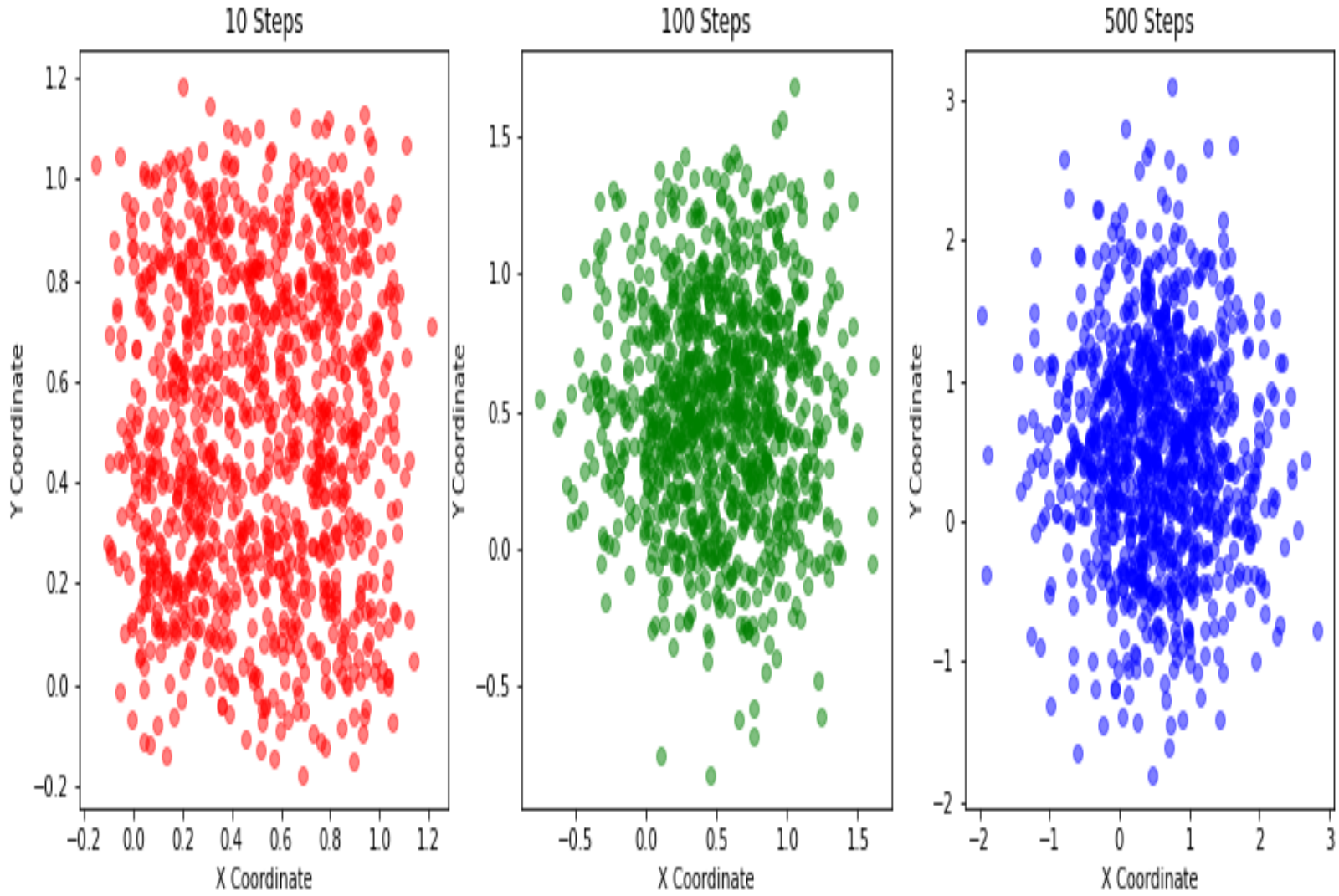

Distribution of Values Generated by genSample
Probability Density
0.00
0.01
0.02
0.03
0.04
0
2
4
6
8
10
x


Convergence of Root Finding Methods
Error
Iterations
10^{8}
10^{5}
10^{2}
10^{-1}
10^{-4}
10^{-7}
0
20
40
60
80
100
Newton-Raphson
Secant
Bisection


Gradient Descent Trajectories
Step size = 0.001
Step size = 0.003
Step size = 0.005
3
2
1
0
−1
y
−2
−1
0
1
2
x
2500
2000
1500
1000
500
2500
2000
1500
1000
500


Average Position and Average Squared Position of 1D Walkers
Average Position
Average Squared Position
3500
3000
2500
2000
1500
1000
500
0
Average Position
0
20
40
60
80
100
Number of Walkers


Scaling of Average Squared Distance with Dimensionality
1D
2D
3D
4D
Average Squared Distance
Number of Steps
0
20
40
60
80
100


10 Steps
100 Steps
500 Steps
Y Coordinate
X Coordinate
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
1.5
0.5
−0.5
3
2
1
−1
−2
−0.2
0.0
0.2
0.4
0.6
0.8
1.0
1.2
−0.5
0.5
1.0
1.5
−2
−1
0
1
2
3

AI?