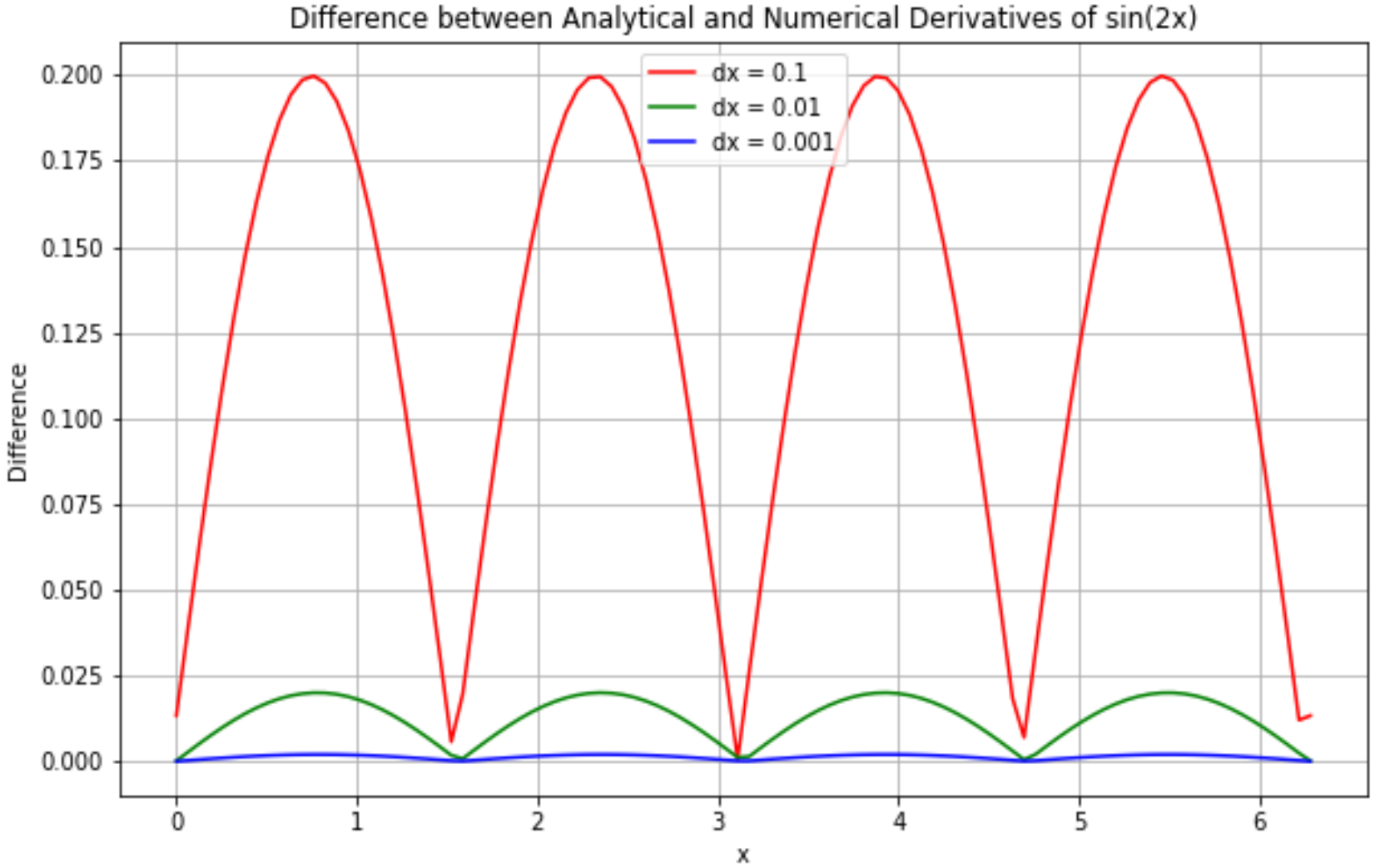
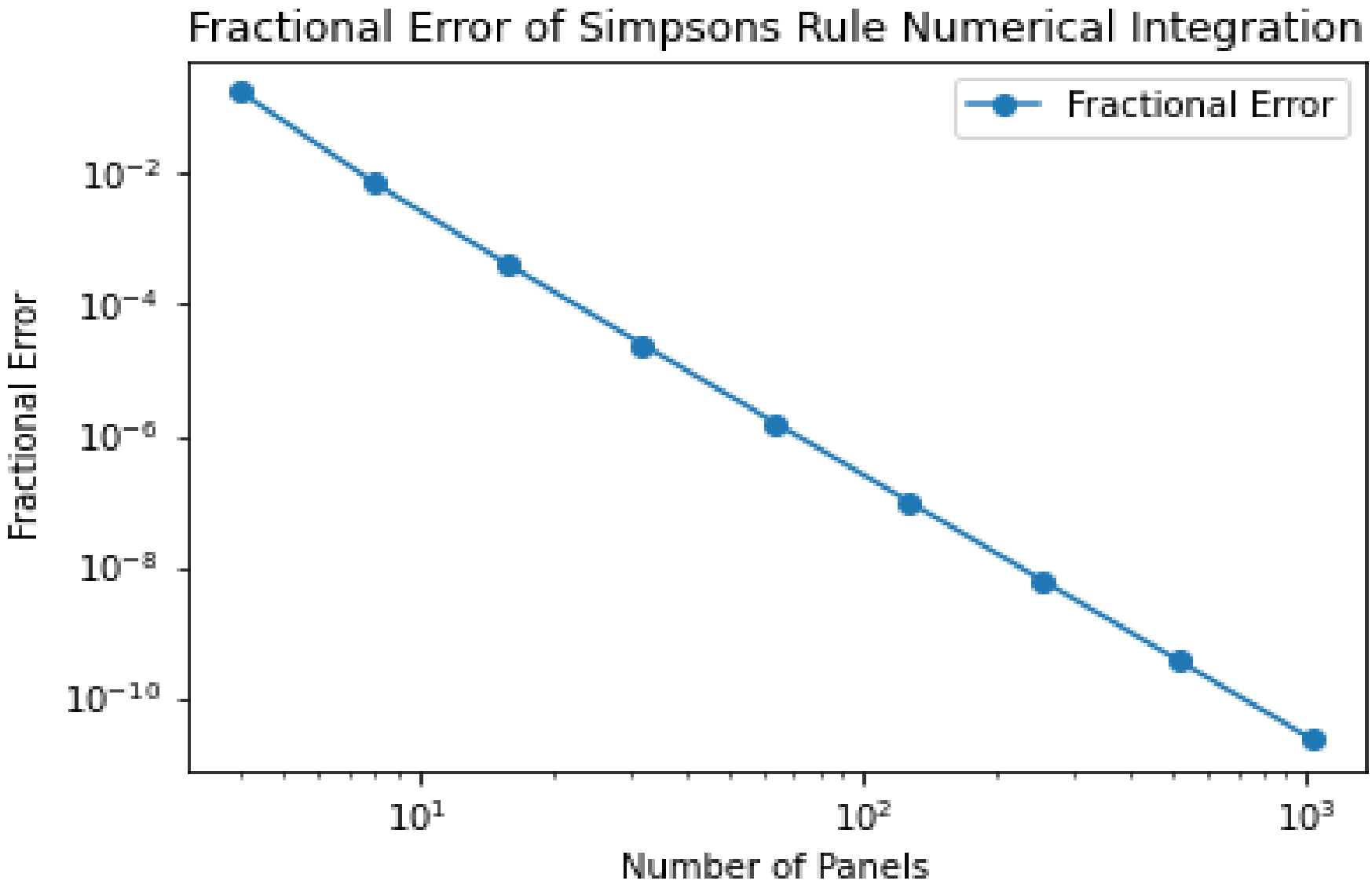
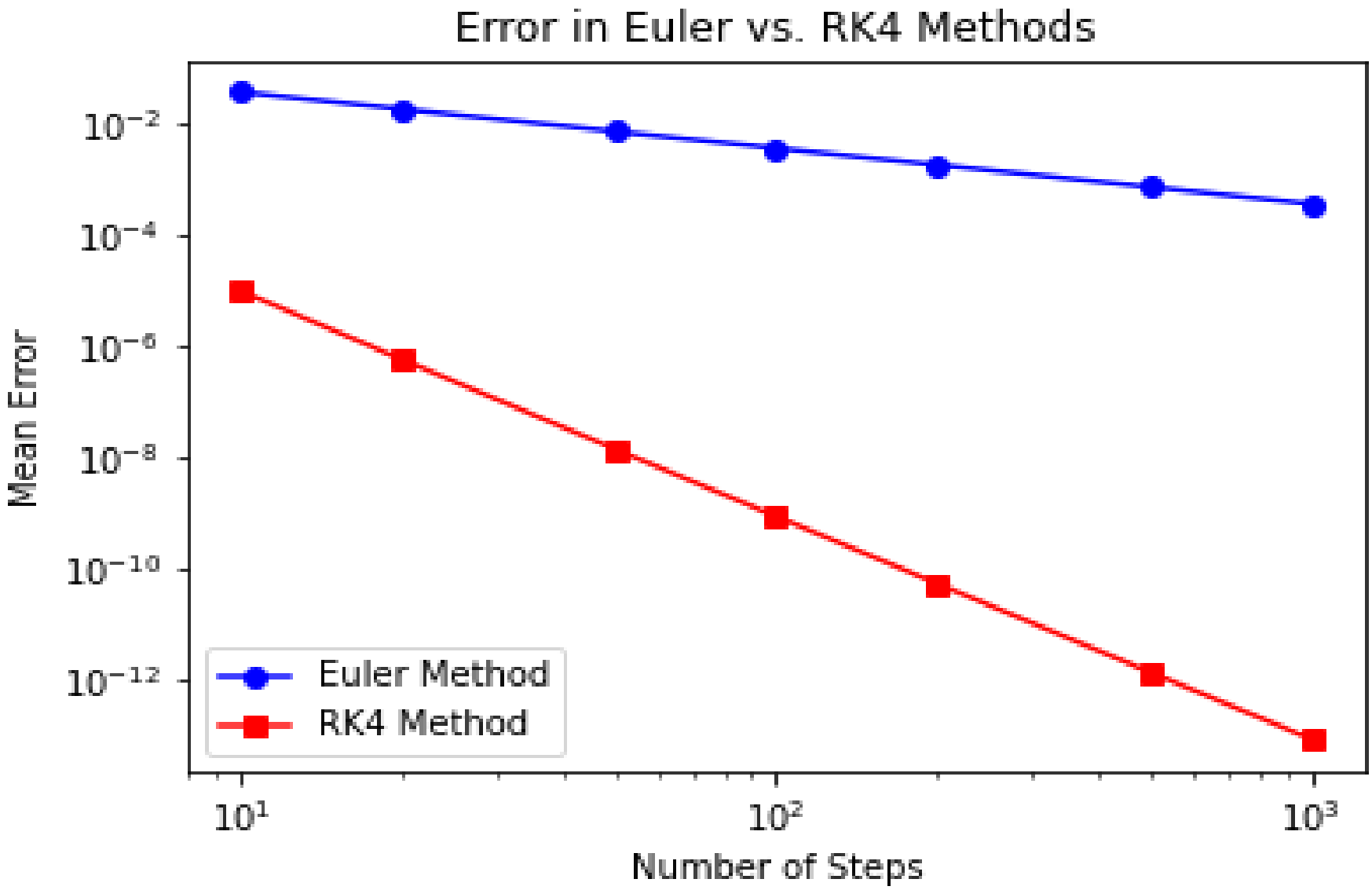
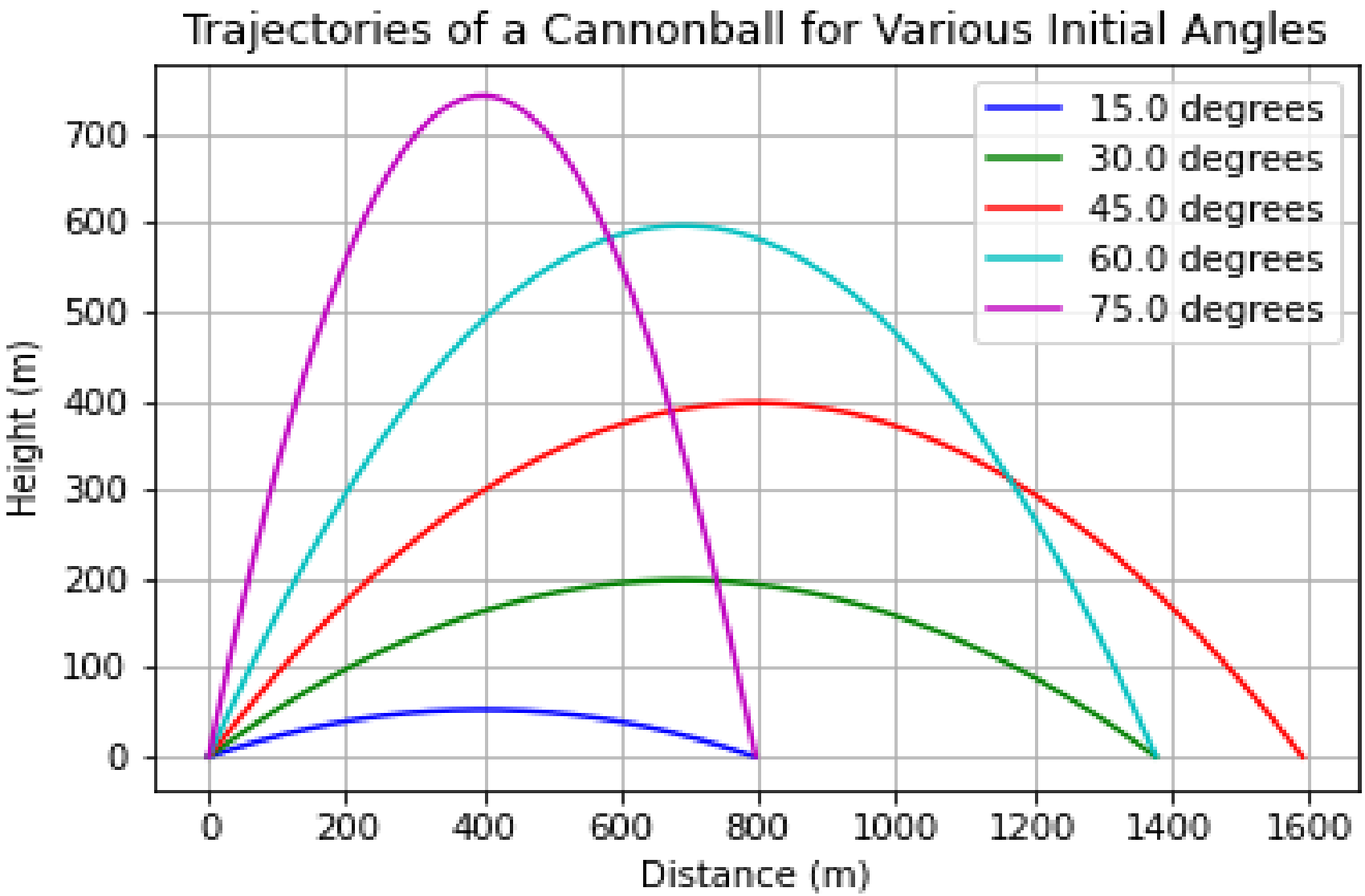
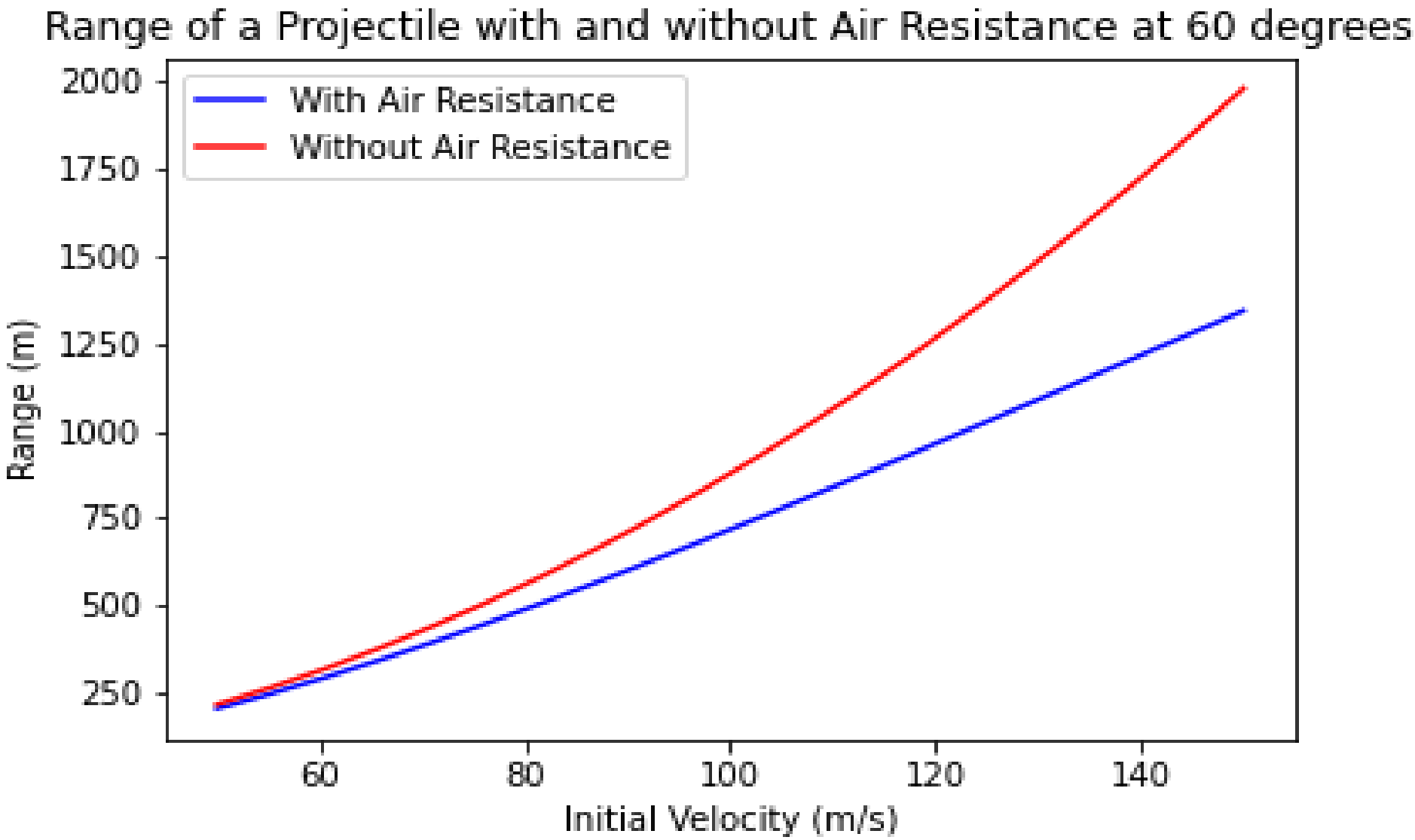
34868

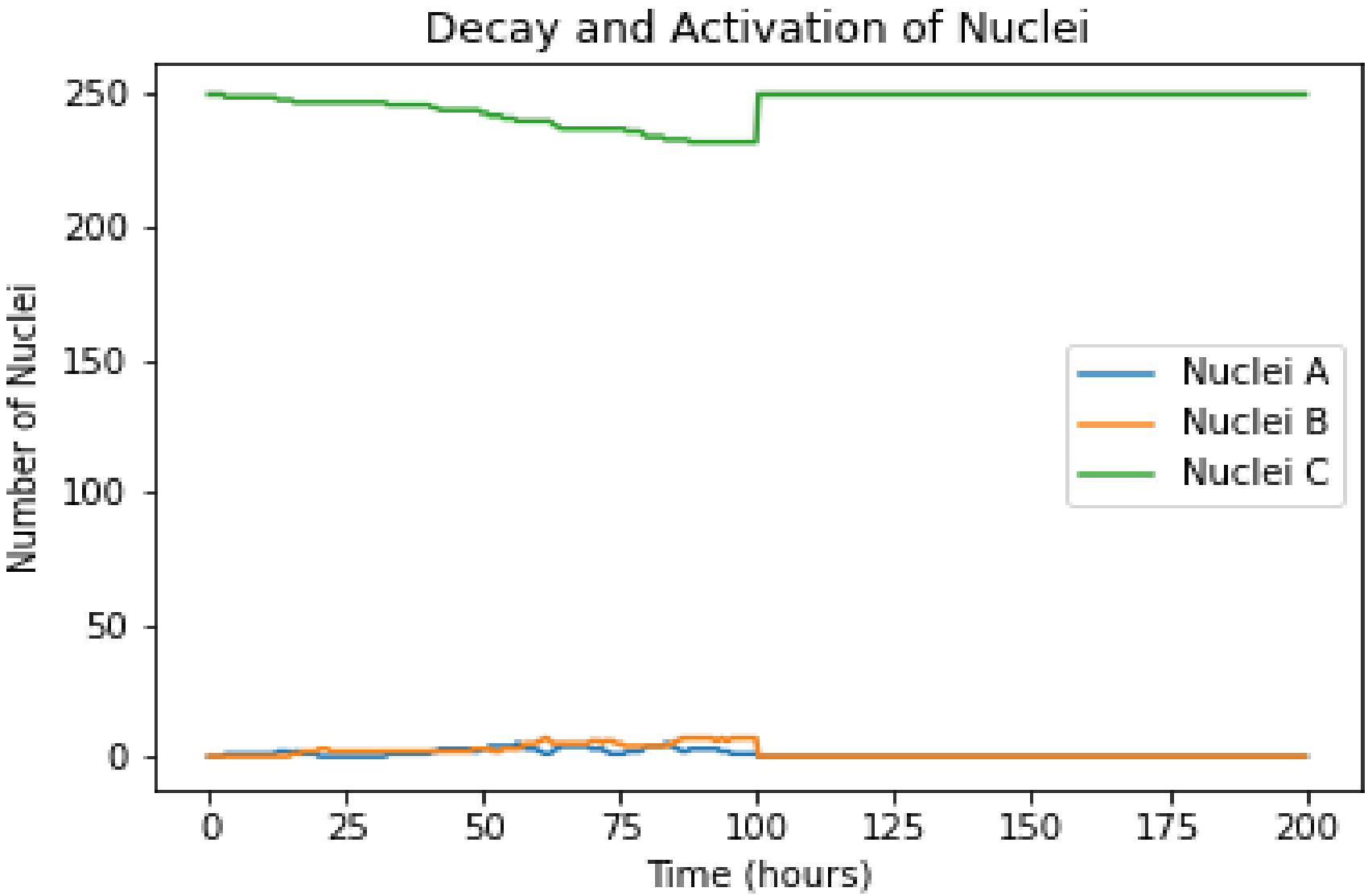

Difference between Analytical and Numerical Derivatives of sin(2x)
dx = 0.1
dx = 0.01
dx = 0.001
Difference
x
0.200
0.175
0.150
0.125
0.100
0.075
0.050
0.025
0.000
0
1
2
3
4
5
6

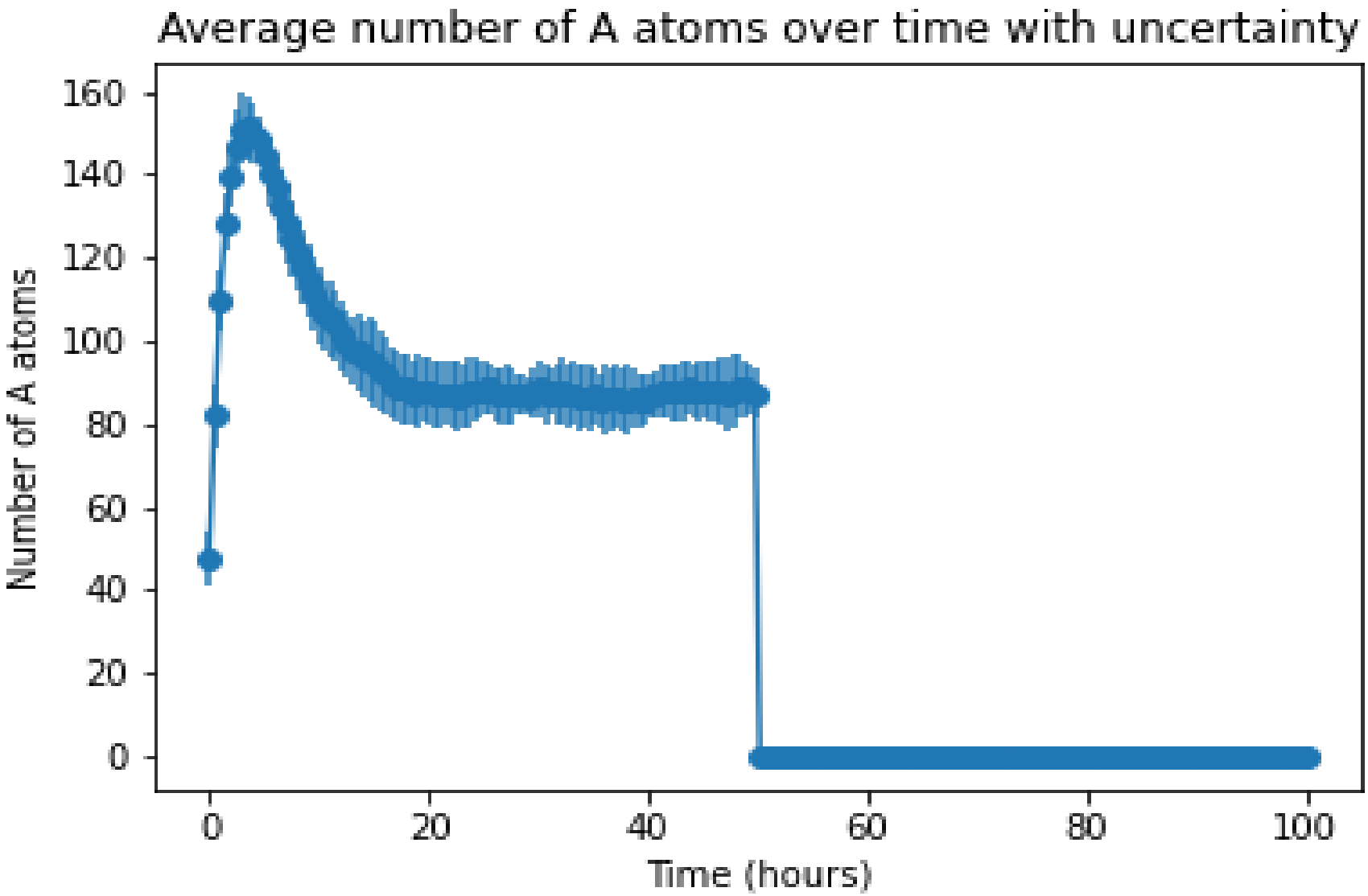

Fractional Error of Simpsons Rule Numerical Integration
Fractional Error
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
Fractional Error
10^{1}
10^{2}
10^{3}
Number of Panels

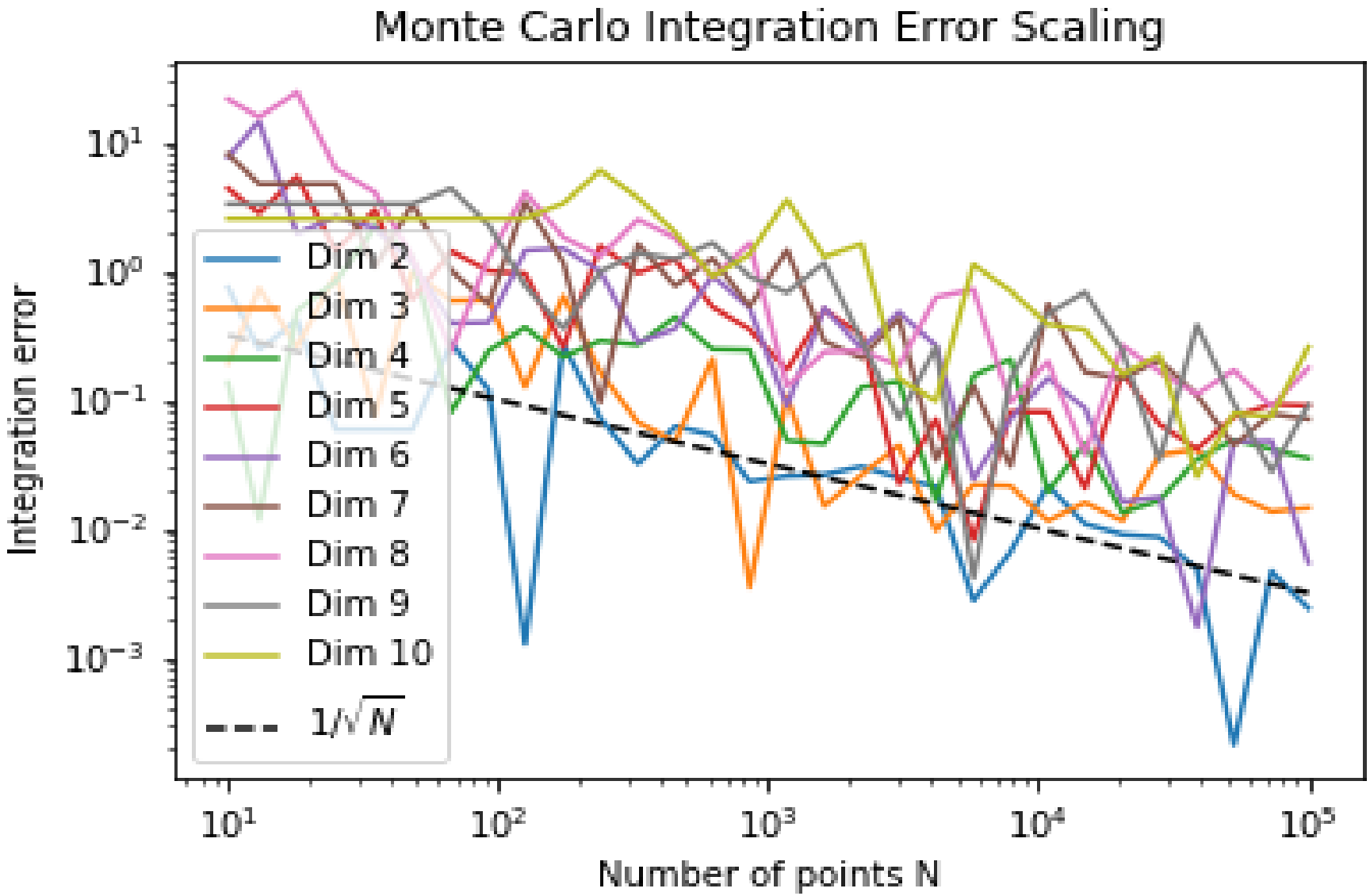

Error in Euler vs. RK4 Methods
Mean Error
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{-12}
Euler Method
RK4 Method
10^{1}
10^{2}
10^{3}
Number of Steps

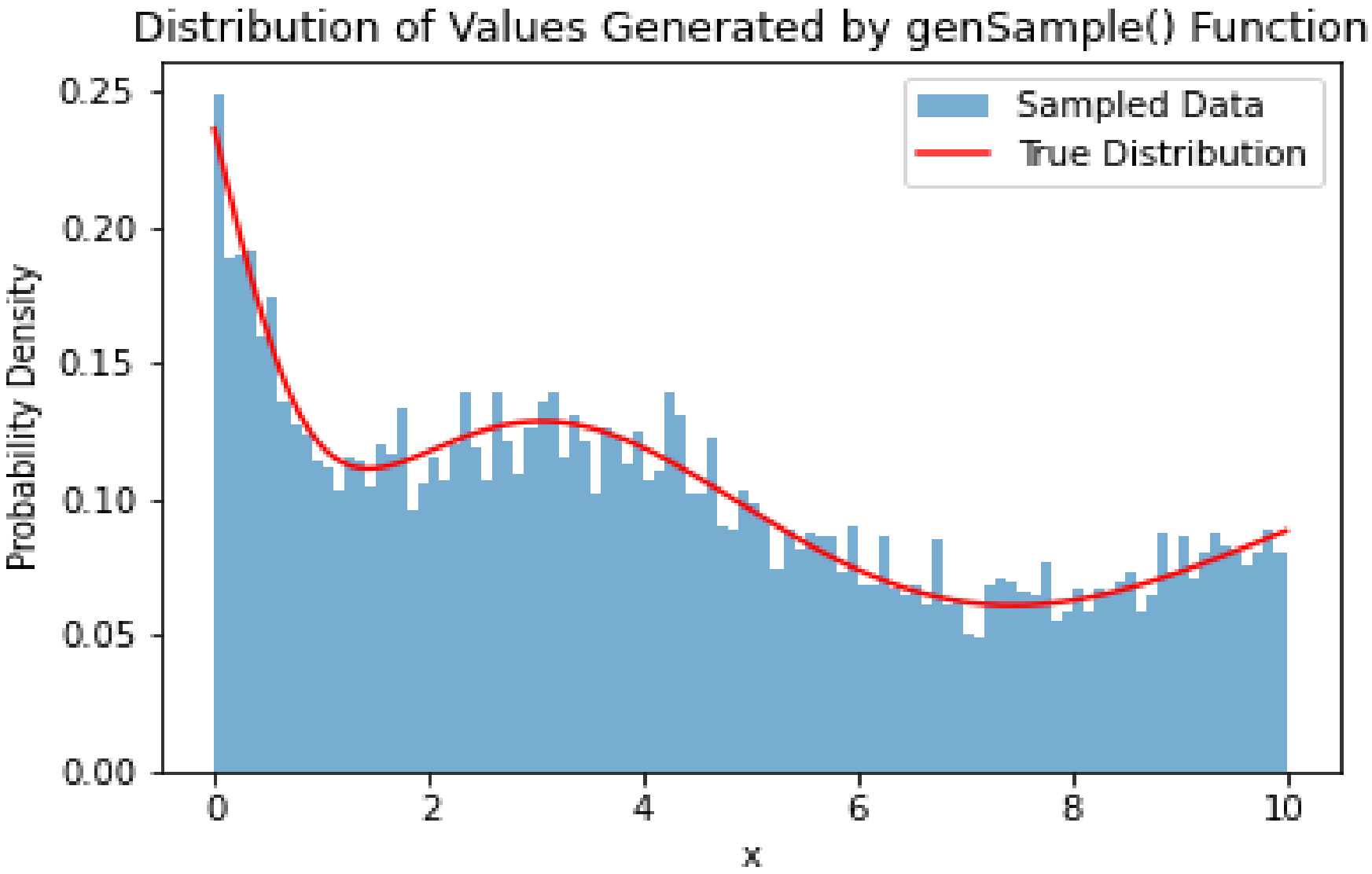

Trajectories of a Cannonball for Various Initial Angles
15.0 degrees
30.0 degrees
45.0 degrees
60.0 degrees
75.0 degrees
Height (m)
0
100
200
300
400
500
600
700
0
200
400
600
800
1000
1200
1400
1600
Distance (m)

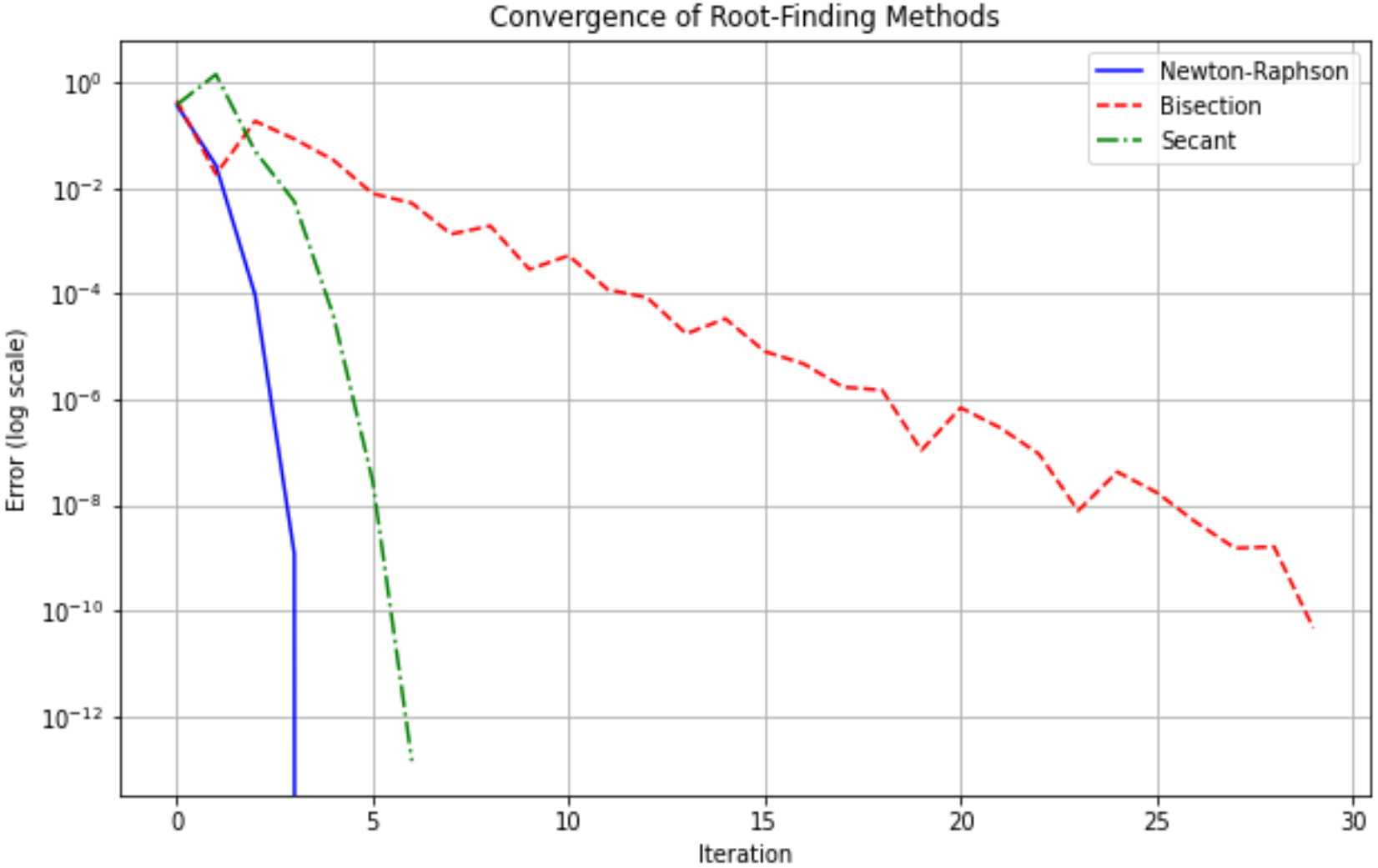

Range of a Projectile with and without Air Resistance at 60 degrees
With Air Resistance
Without Air Resistance
Range (m)
2000
1750
1500
1250
1000
750
500
250
60
80
100
120
140
Initial Velocity (m/s)

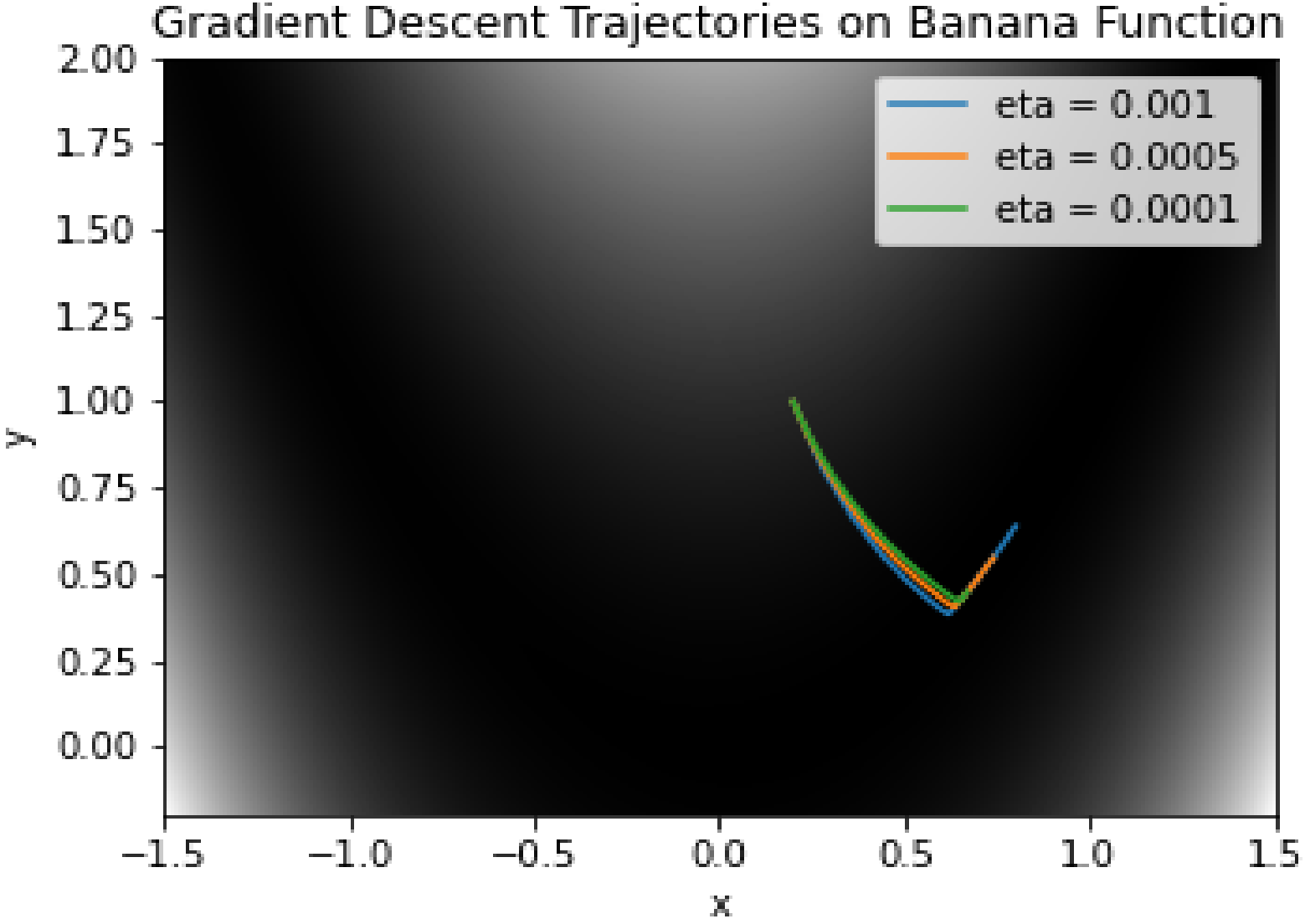

Decay and Activation of Nuclei
Number of Nuclei
Time (hours)
Nuclei A
Nuclei B
Nuclei C
0
50
100
150
200
250
0
25
50
75
100
125
150
175
200

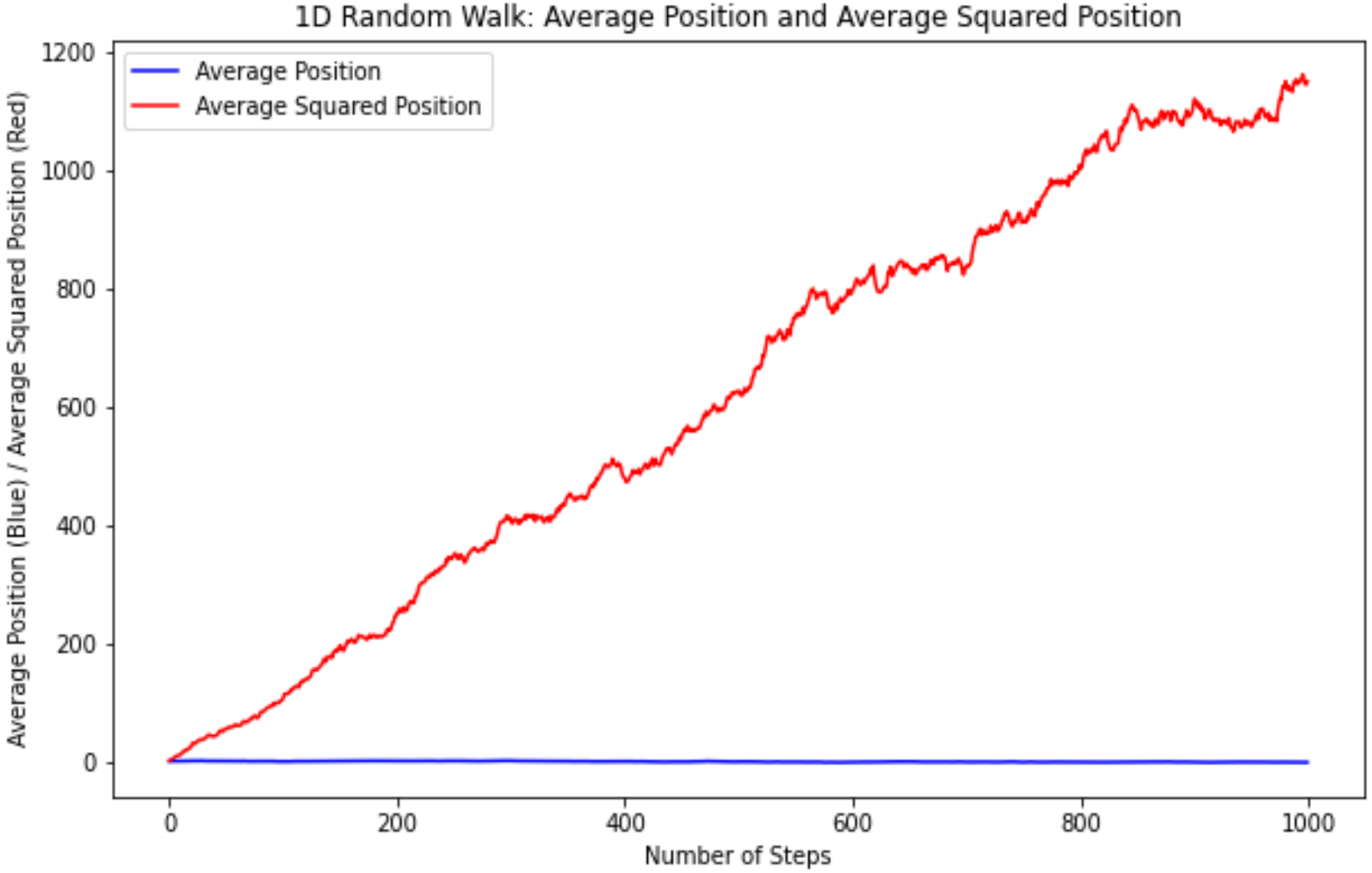

Average number of A atoms over time with uncertainty
Number of A atoms
Time (hours)
0
20
40
60
80
100
120
140
160
0
20
40
60
80
100

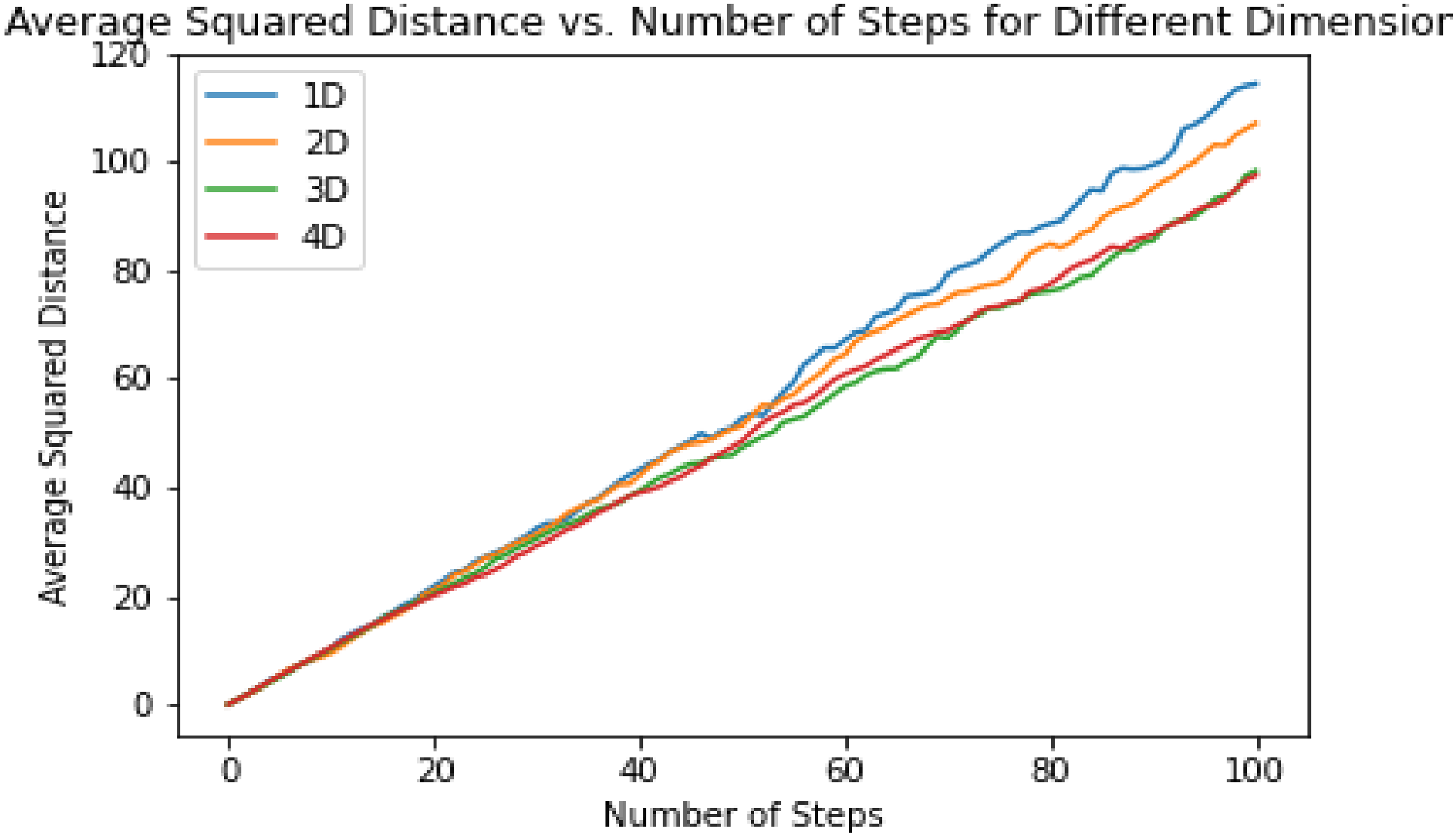

Monte Carlo Integration Error Scaling
Integration error
Number of points N
10^{1}
10^{0}
10^{-1}
10^{-2}
10^{-3}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}
Dim 2
Dim 3
Dim 4
Dim 5
Dim 6
Dim 7
Dim 8
Dim 9
Dim 10
$1/\sqrt{N}$

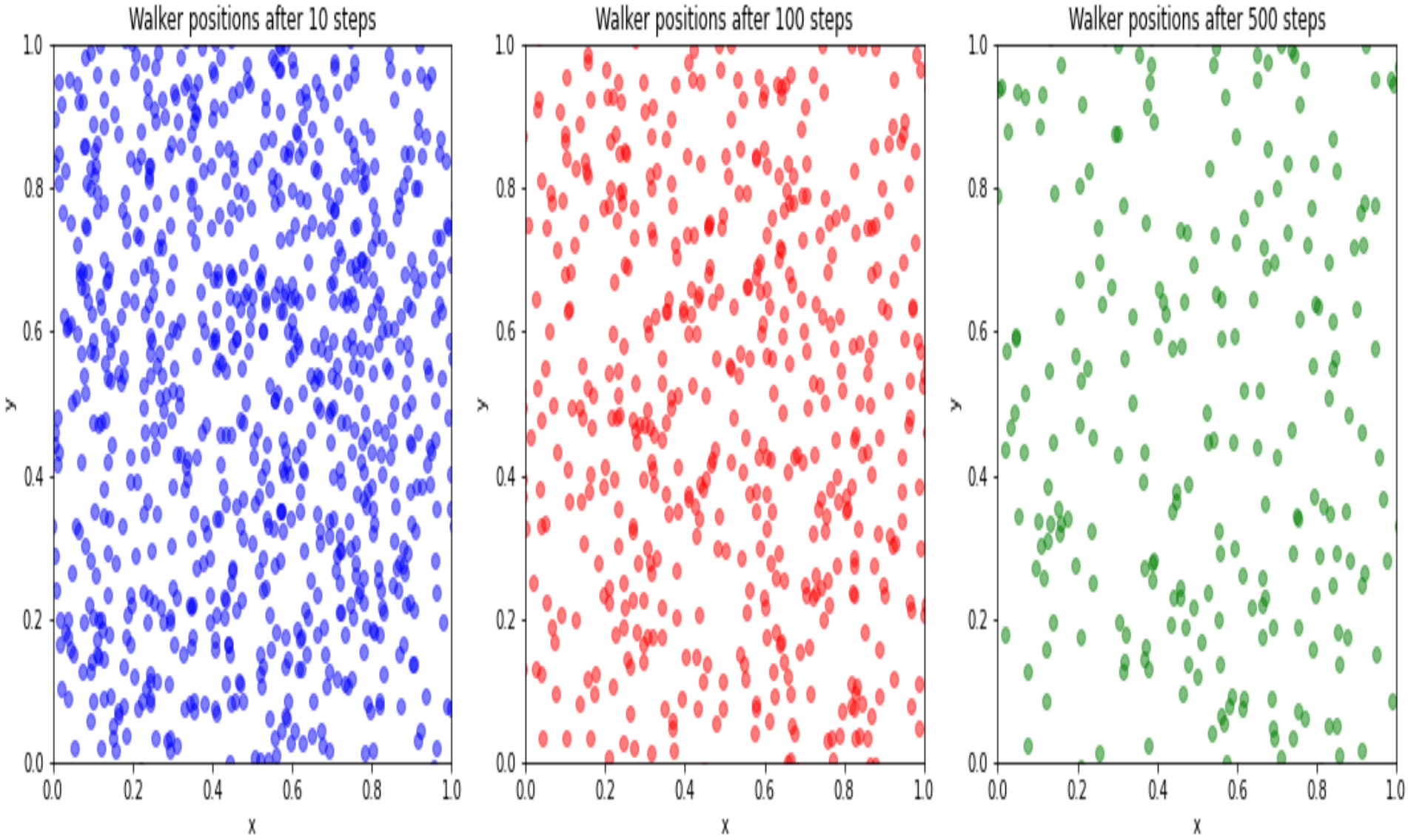

Distribution of Values Generated by genSample() Function
Sampled Data
True Distribution
Probability Density
0.25
0.20
0.15
0.10
0.05
0.00
0
2
4
6
8
10
x


Convergence of Root-Finding Methods
Newton-Raphson
Bisection
Secant
Error (log scale)
10^{0}
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{-12}
0
5
10
15
20
25
30
Iteration


Gradient Descent Trajectories on Banana Function
eta = 0.001
eta = 0.0005
eta = 0.0001
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
y
−1.5
−1.0
−0.5
0.0
0.5
1.0
1.5
x


1D Random Walk: Average Position and Average Squared Position
Average Position
Average Squared Position
Average Position (Blue) / Average Squared Position (Red)
Number of Steps
0
200
400
600
800
1000
1200


Average Squared Distance vs. Number of Steps for Different Dimensior
1D
2D
3D
4D
Average Squared Distance
Number of Steps
0
20
40
60
80
100
120


Walker positions after 10 steps
Walker positions after 100 steps
Walker positions after 500 steps
x
y
0.0
0.2
0.4
0.6
0.8
1.0

AI?