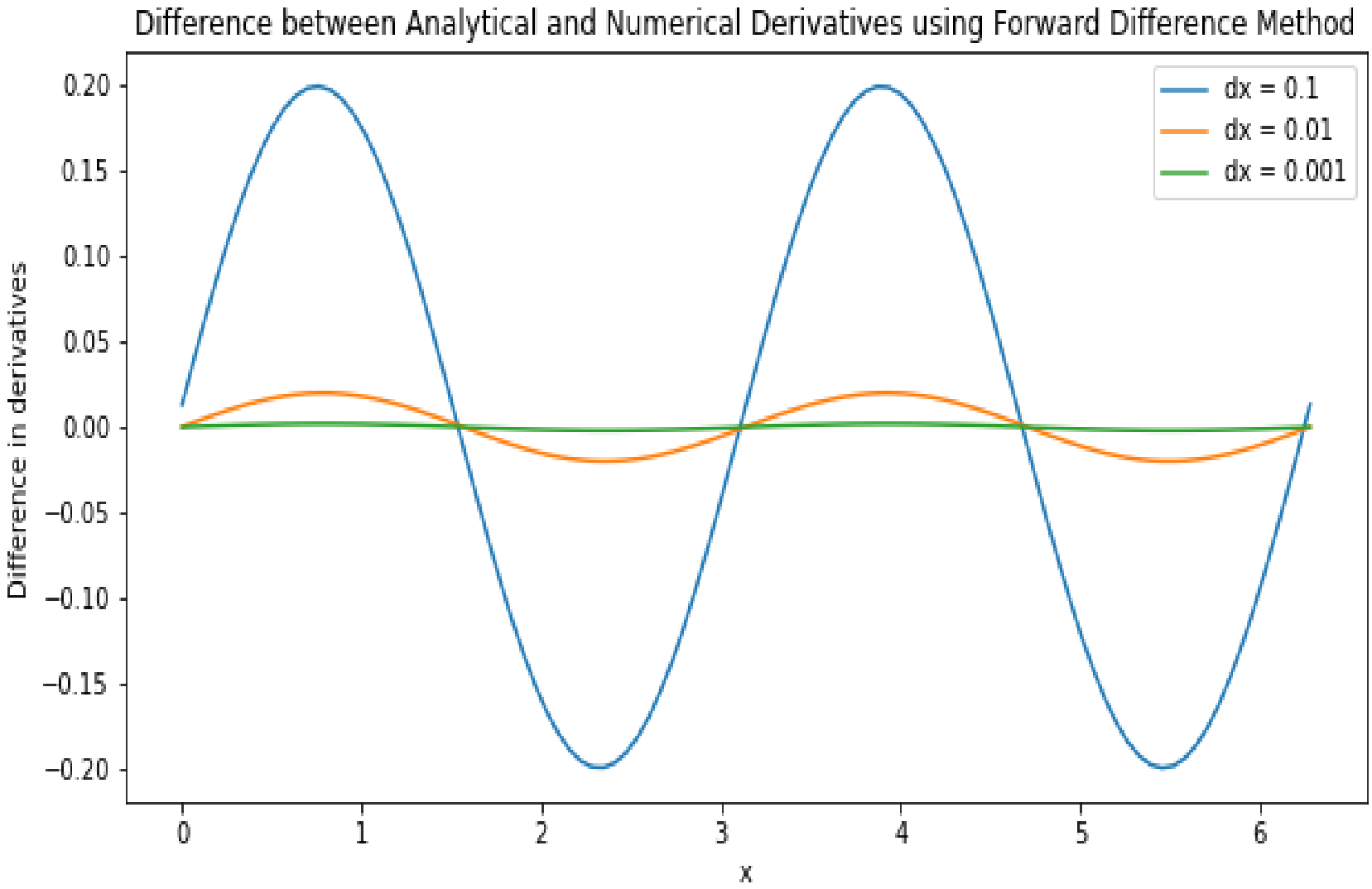
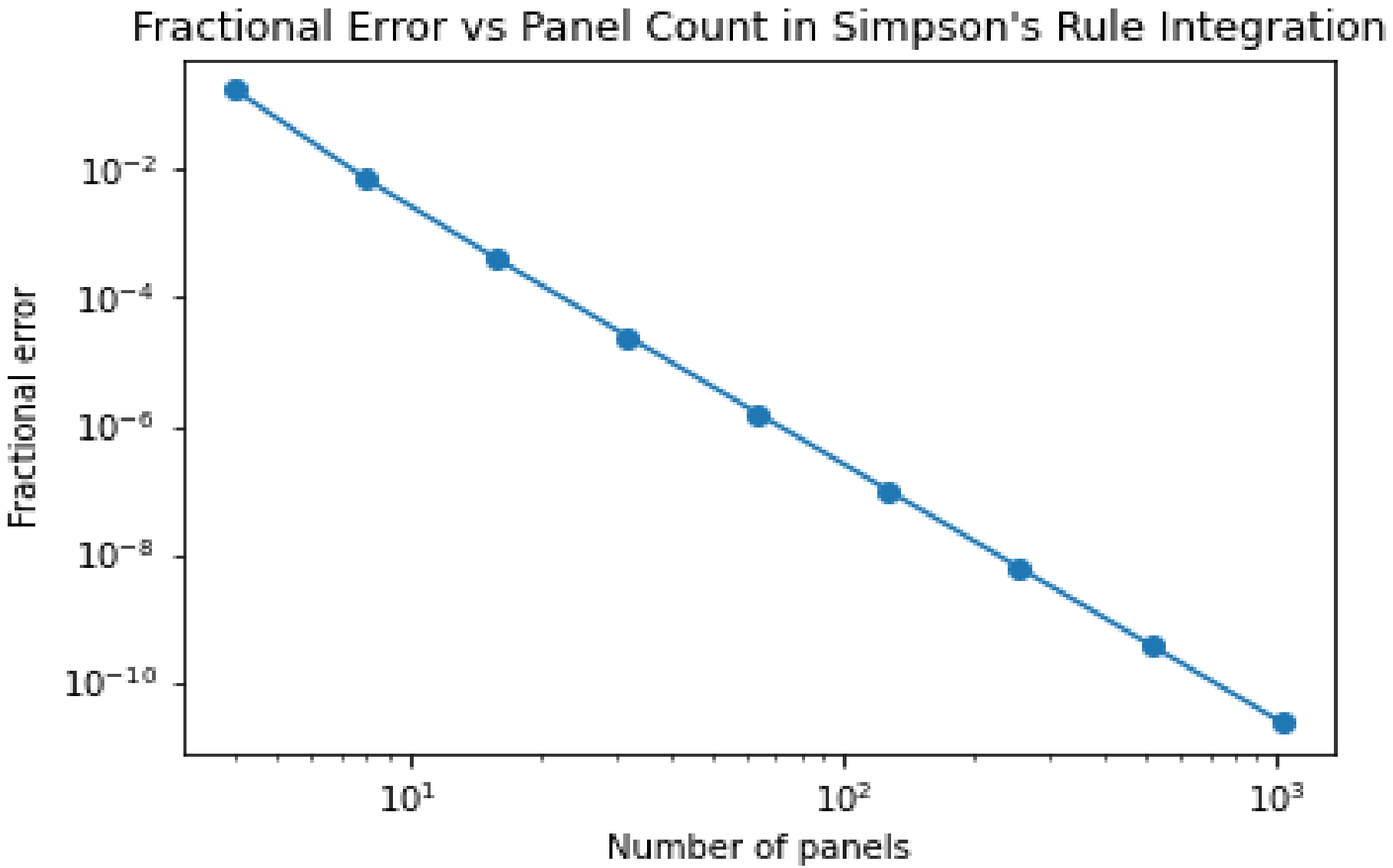
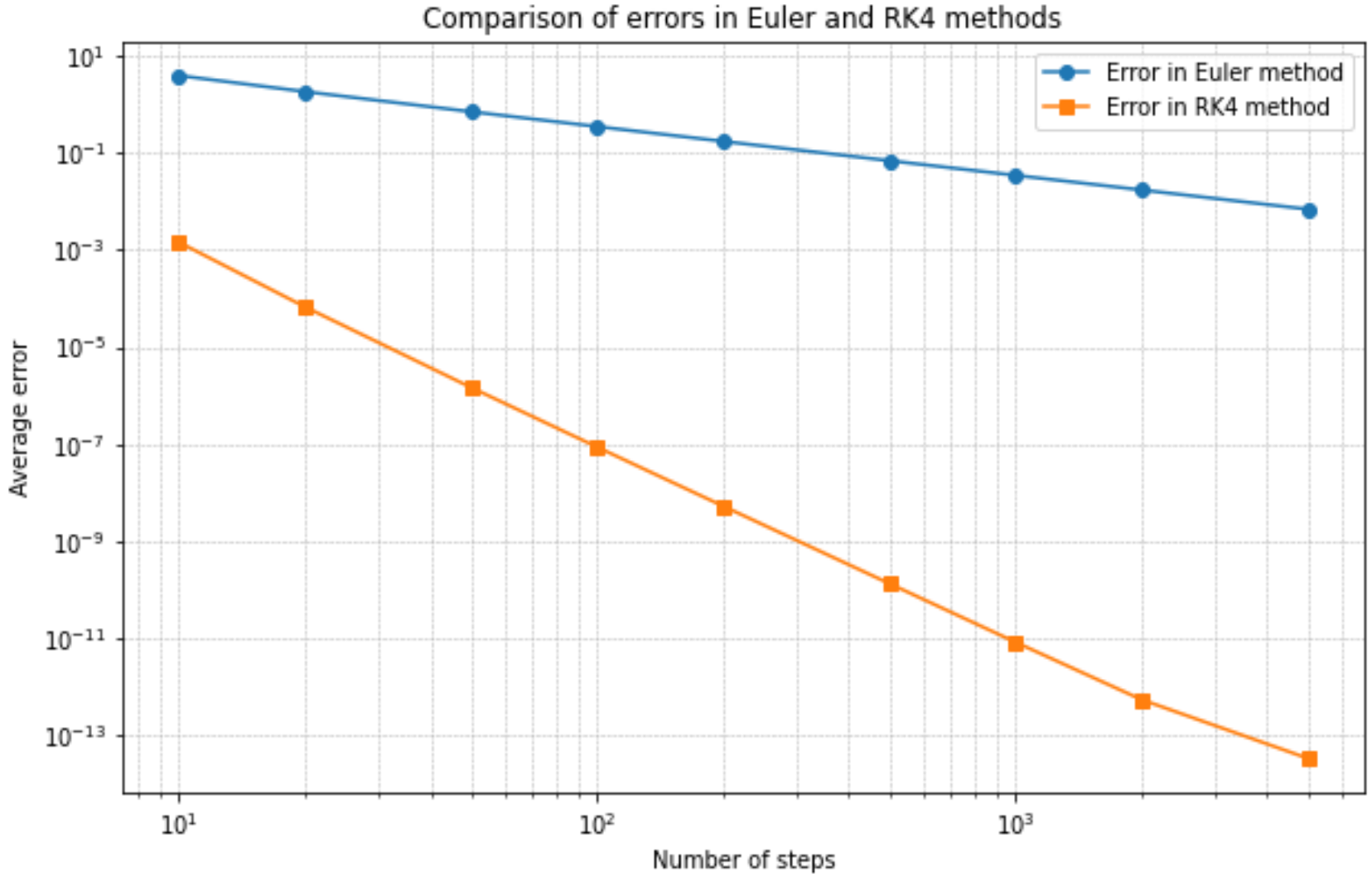
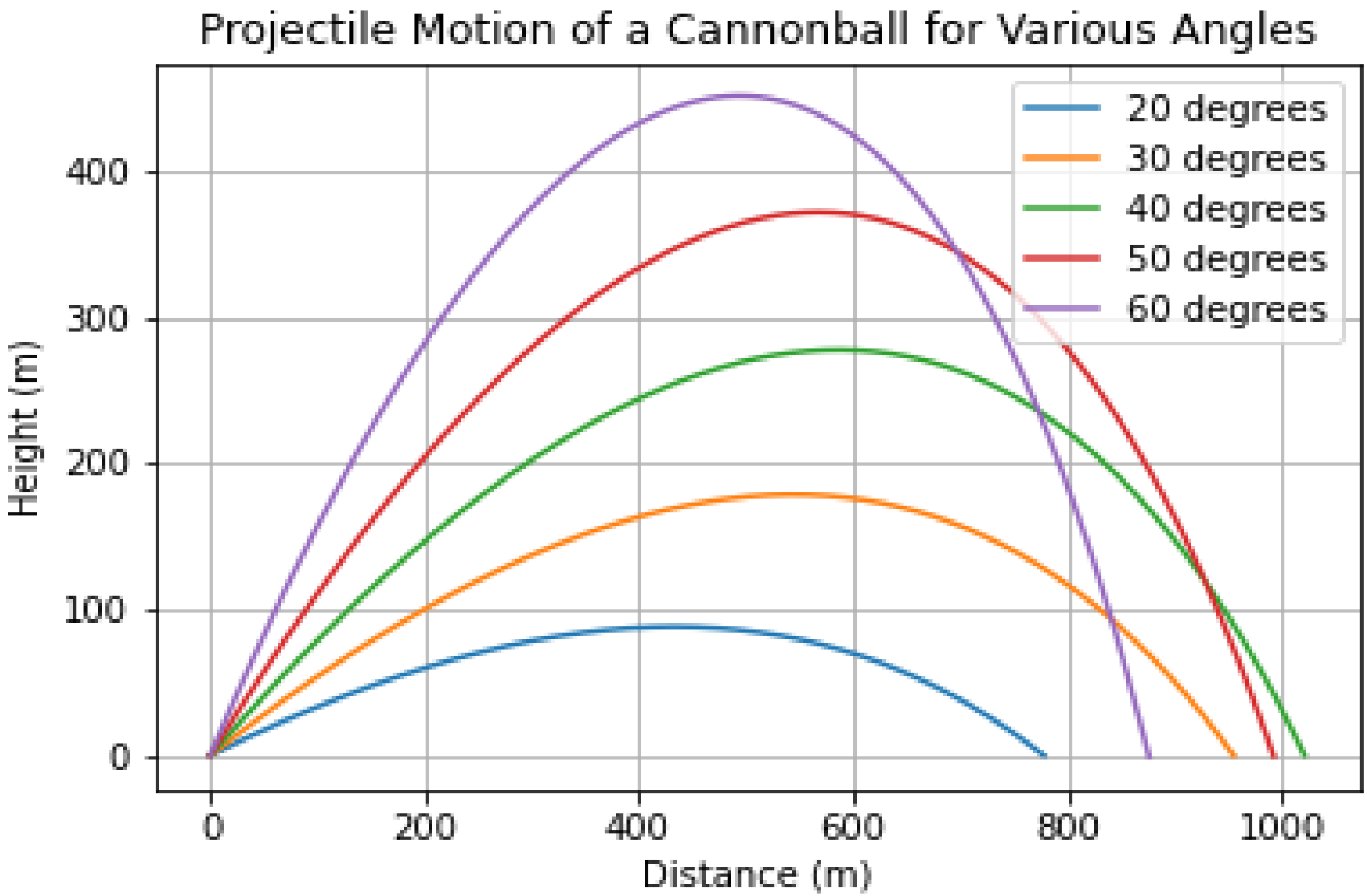
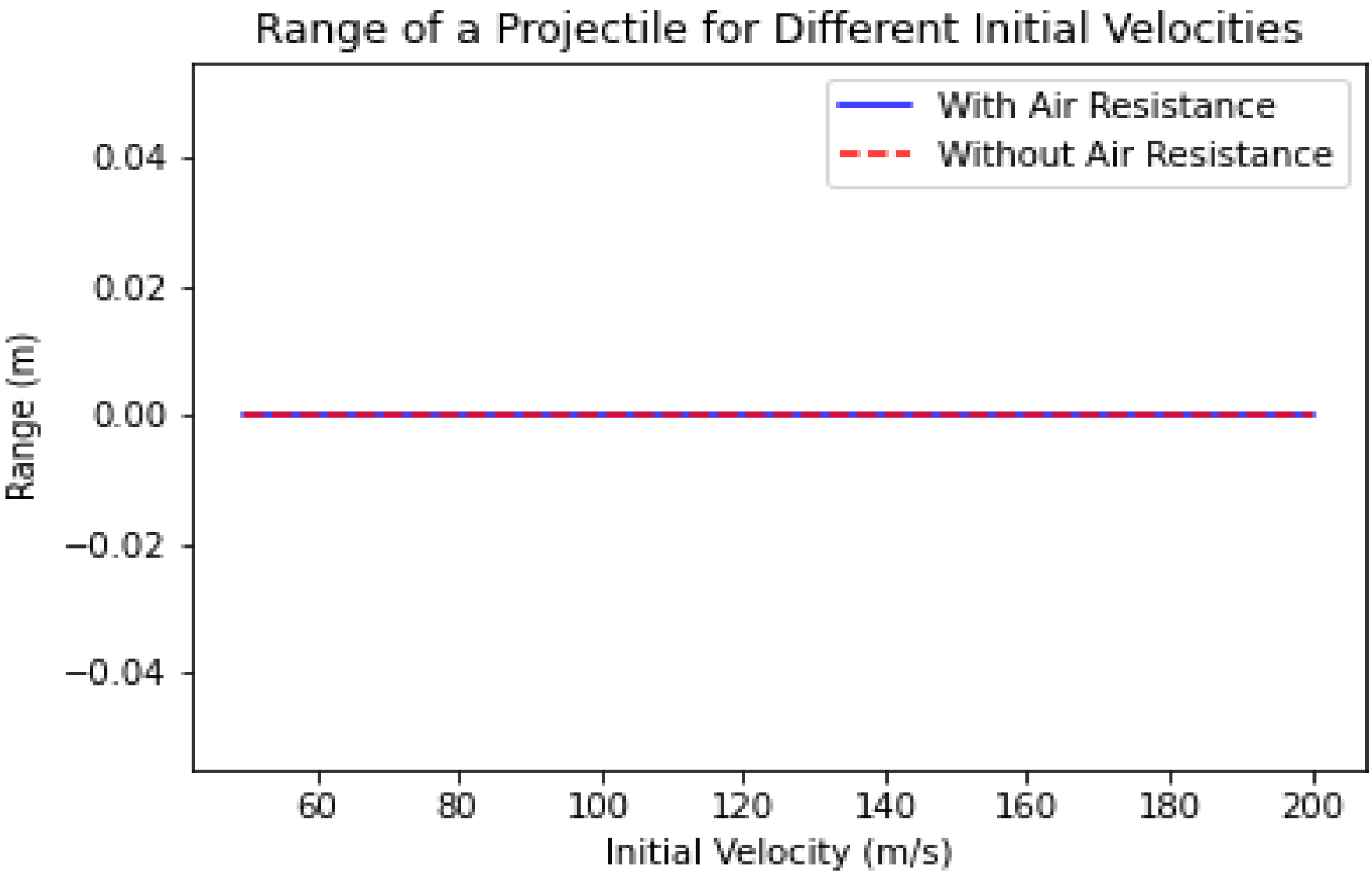
88975

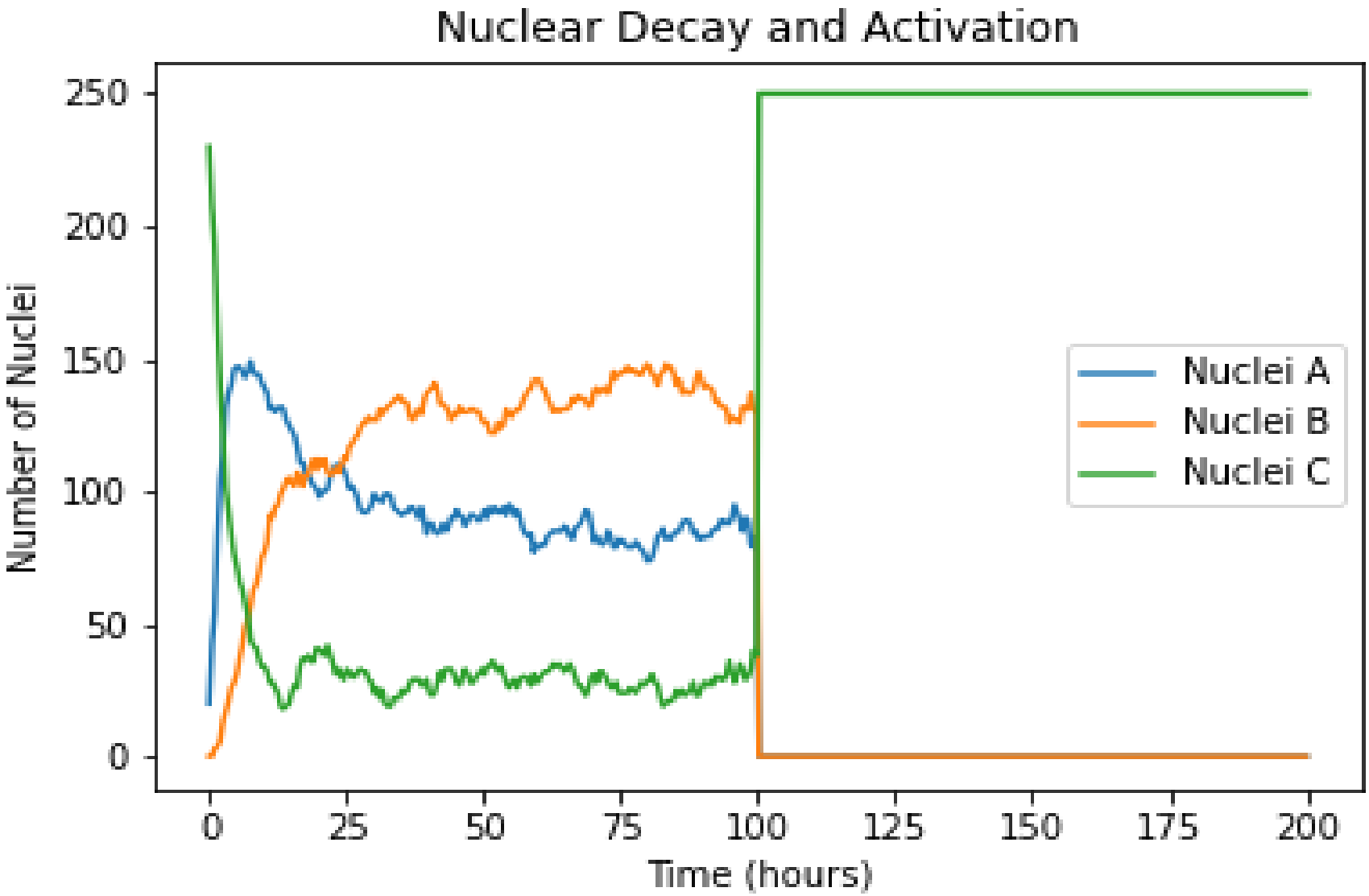

Difference between Analytical and Numerical Derivatives using Forward Difference Method
dx = 0.1
dx = 0.01
dx = 0.001
Difference in derivatives
0.20
0.15
0.10
0.05
0.00
−0.05
−0.10
−0.15
−0.20
0
1
2
3
4
5
6
x

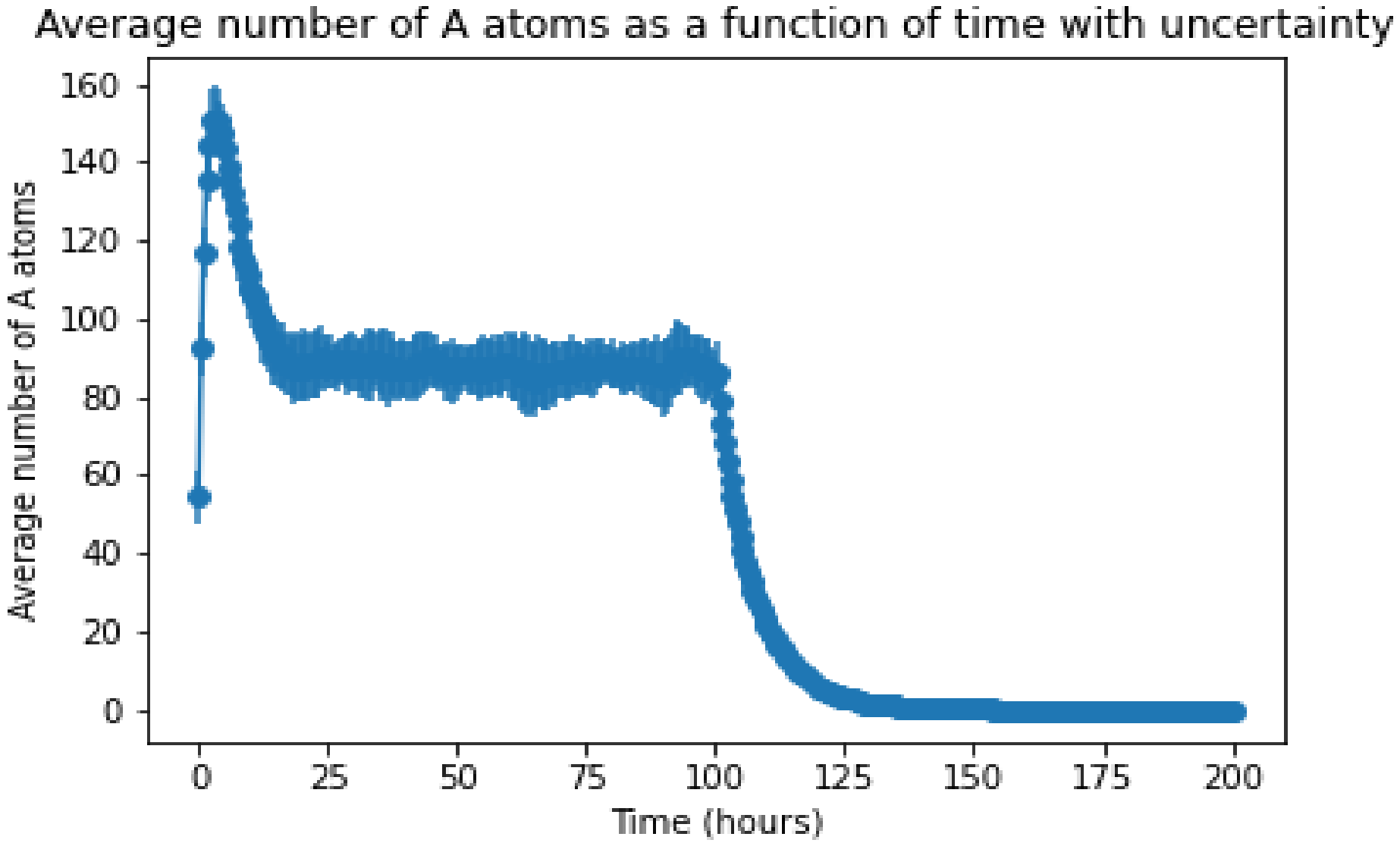

Fractional Error vs Panel Count in Simpson's Rule Integration
Fractional error
10^{-2}
10^{-4}
10^{-6}
10^{-8}
10^{-10}
10^{1}
10^{2}
10^{3}
Number of panels

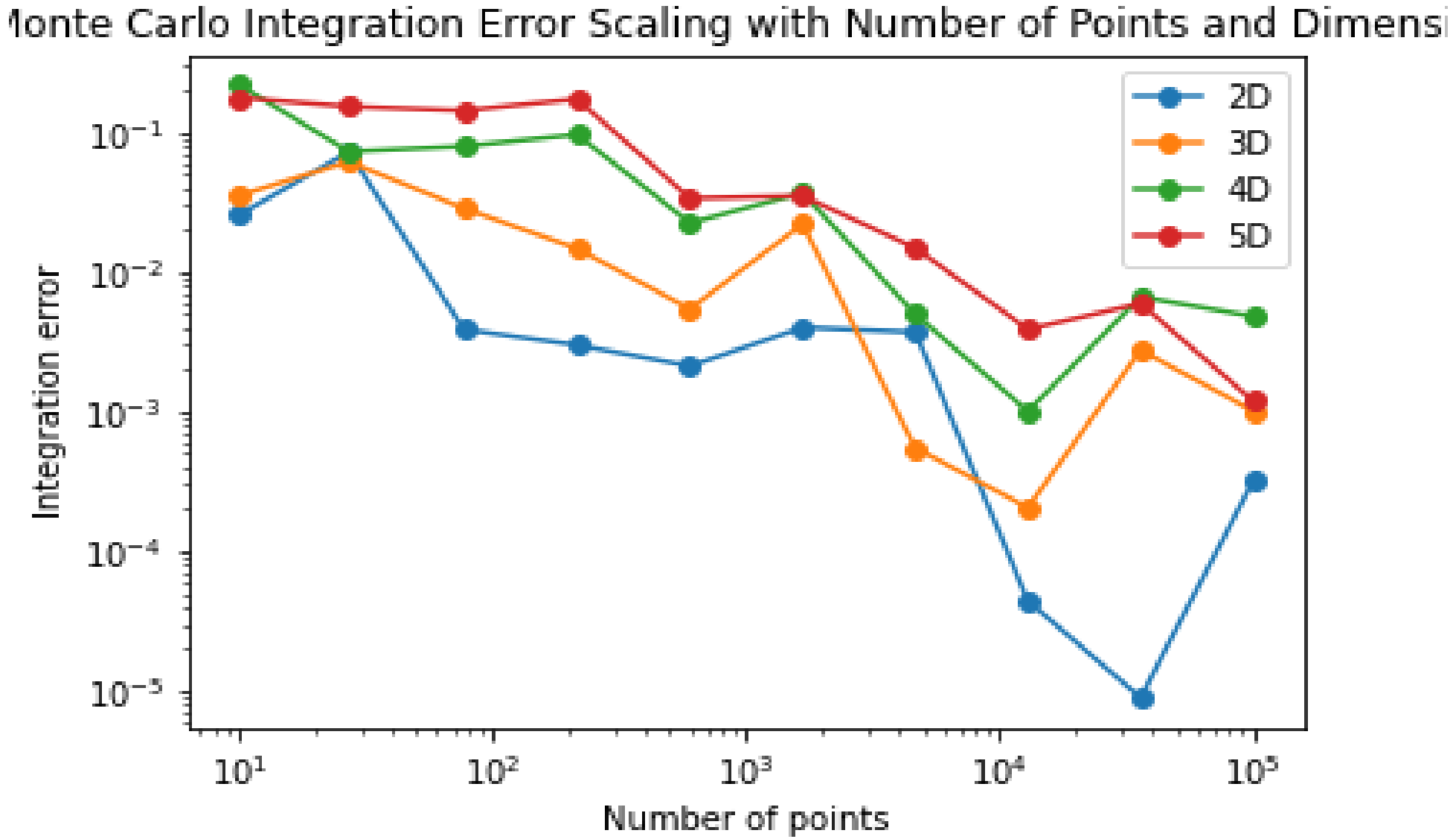

Comparison of errors in Euler and RK4 methods
Error in Euler method
Error in RK4 method
Average error
Number of steps
10^{1}
10^{-1}
10^{-3}
10^{-5}
10^{-7}
10^{-9}
10^{-11}
10^{-13}
10^{1}
10^{2}
10^{3}

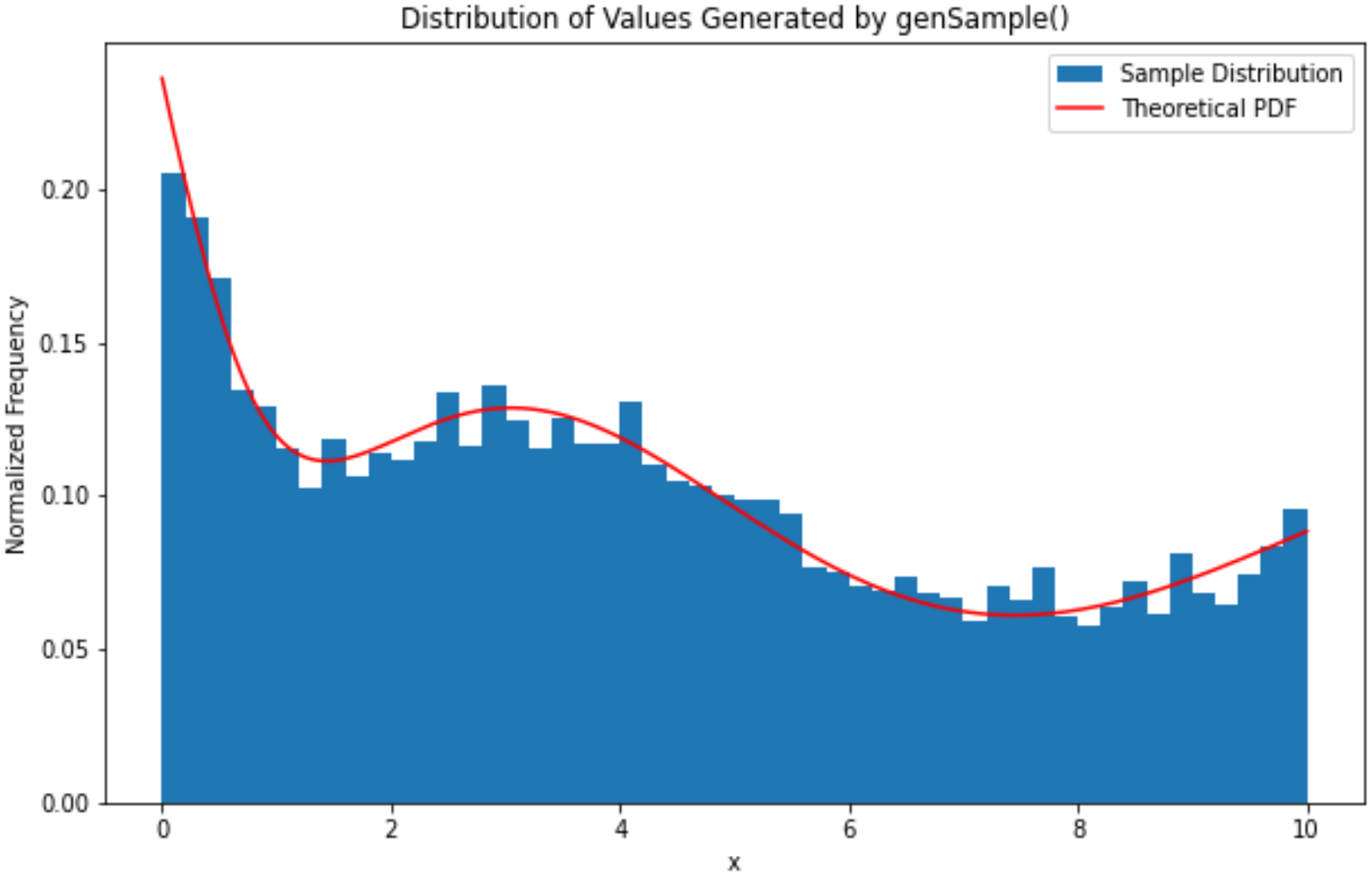

Projectile Motion of a Cannonball for Various Angles
20 degrees
30 degrees
40 degrees
50 degrees
60 degrees
Height (m)
0
100
200
300
400
0
200
400
600
800
1000
Distance (m)

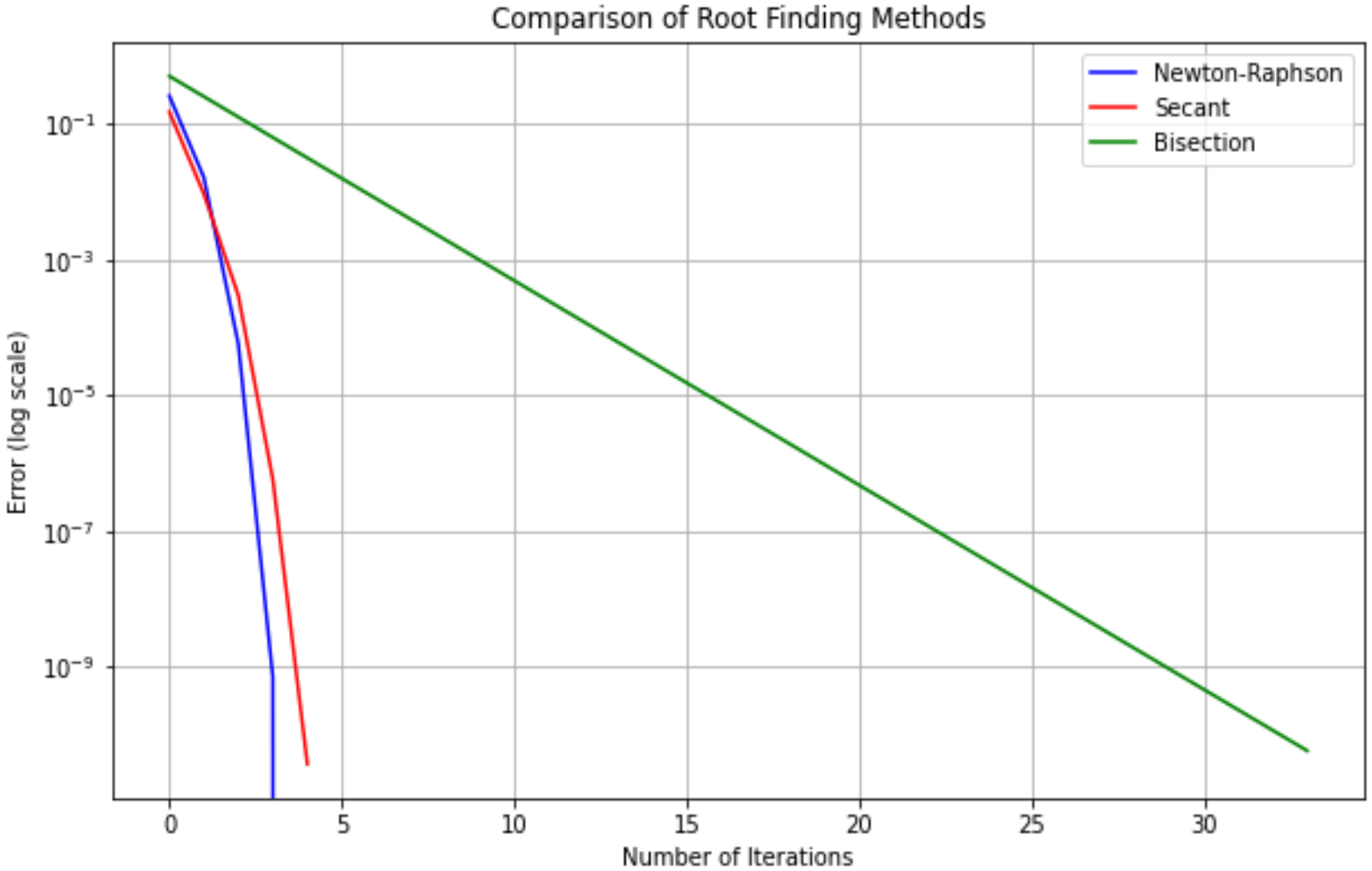

Range of a Projectile for Different Initial Velocities
With Air Resistance
Without Air Resistance
0.04
0.02
0.00
−0.02
−0.04
Range (m)
60
80
100
120
140
160
180
200
Initial Velocity (m/s)

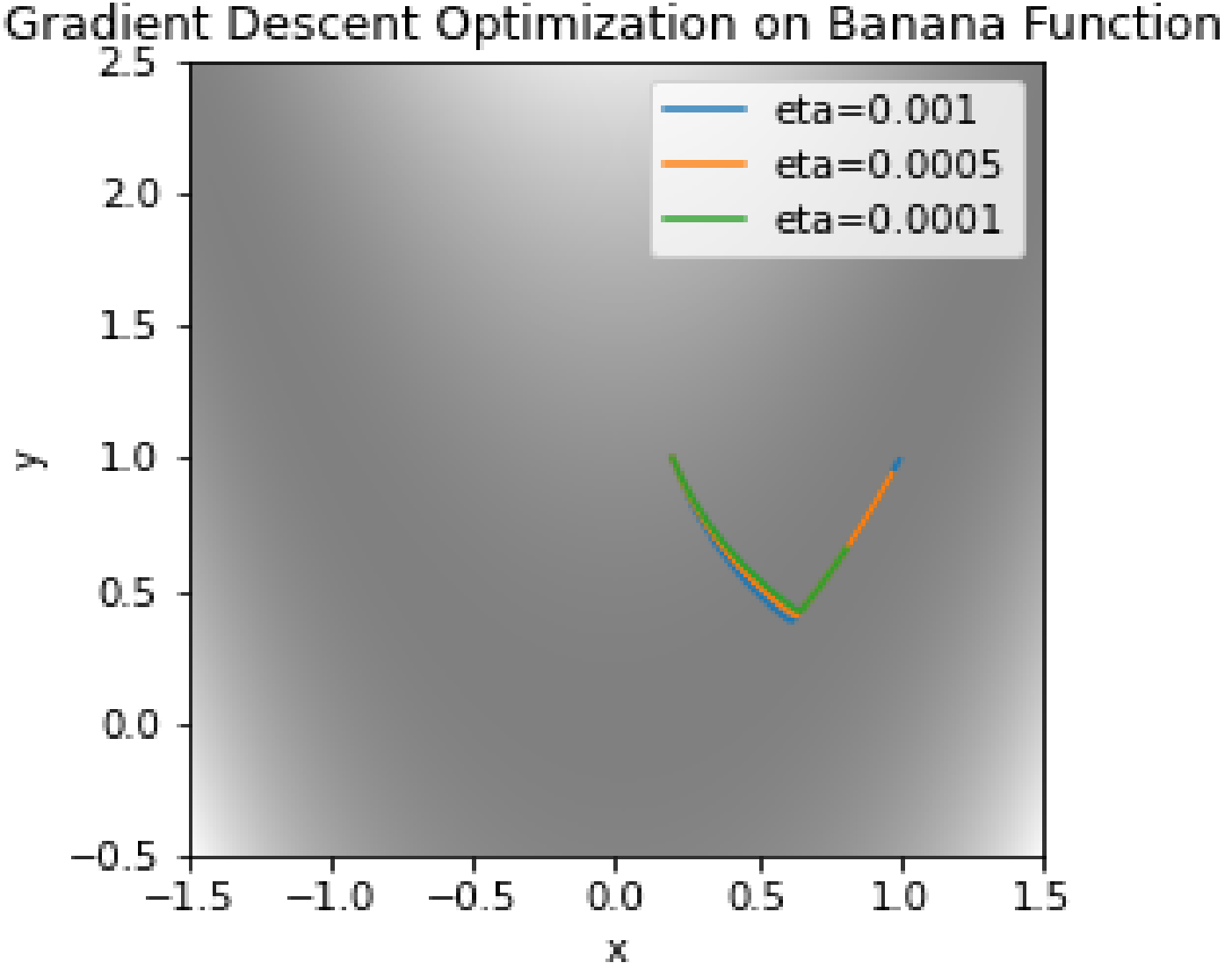

Nuclear Decay and Activation
Number of Nuclei
Time (hours)
Nuclei A
Nuclei B
Nuclei C
0
50
100
150
200
250
0
25
50
75
100
125
150
175
200

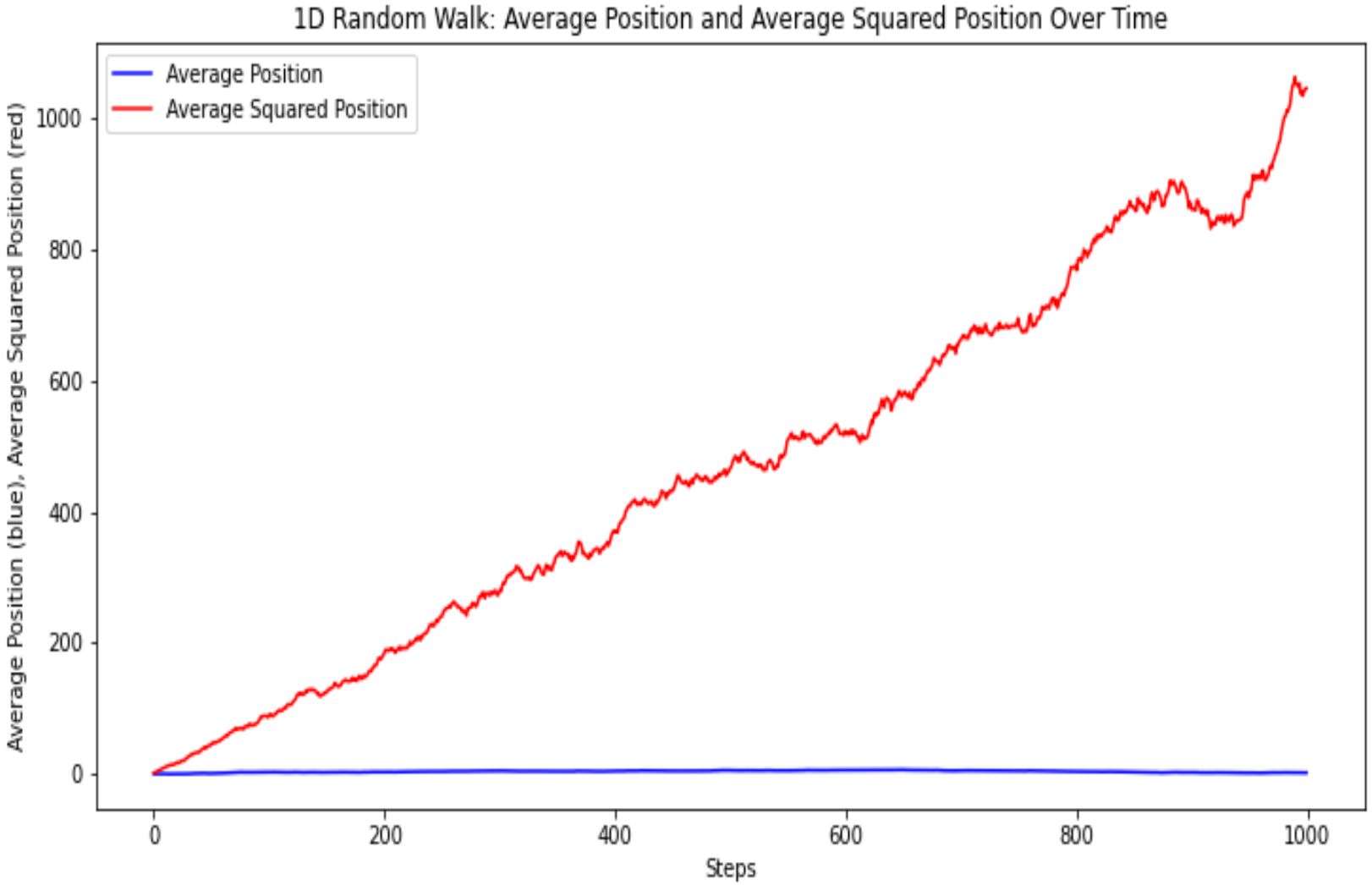

Average number of A atoms as a function of time with uncertainty
Average number of A atoms
Time (hours)
0
20
40
60
80
100
120
140
160
0
25
50
75
100
125
150
175
200

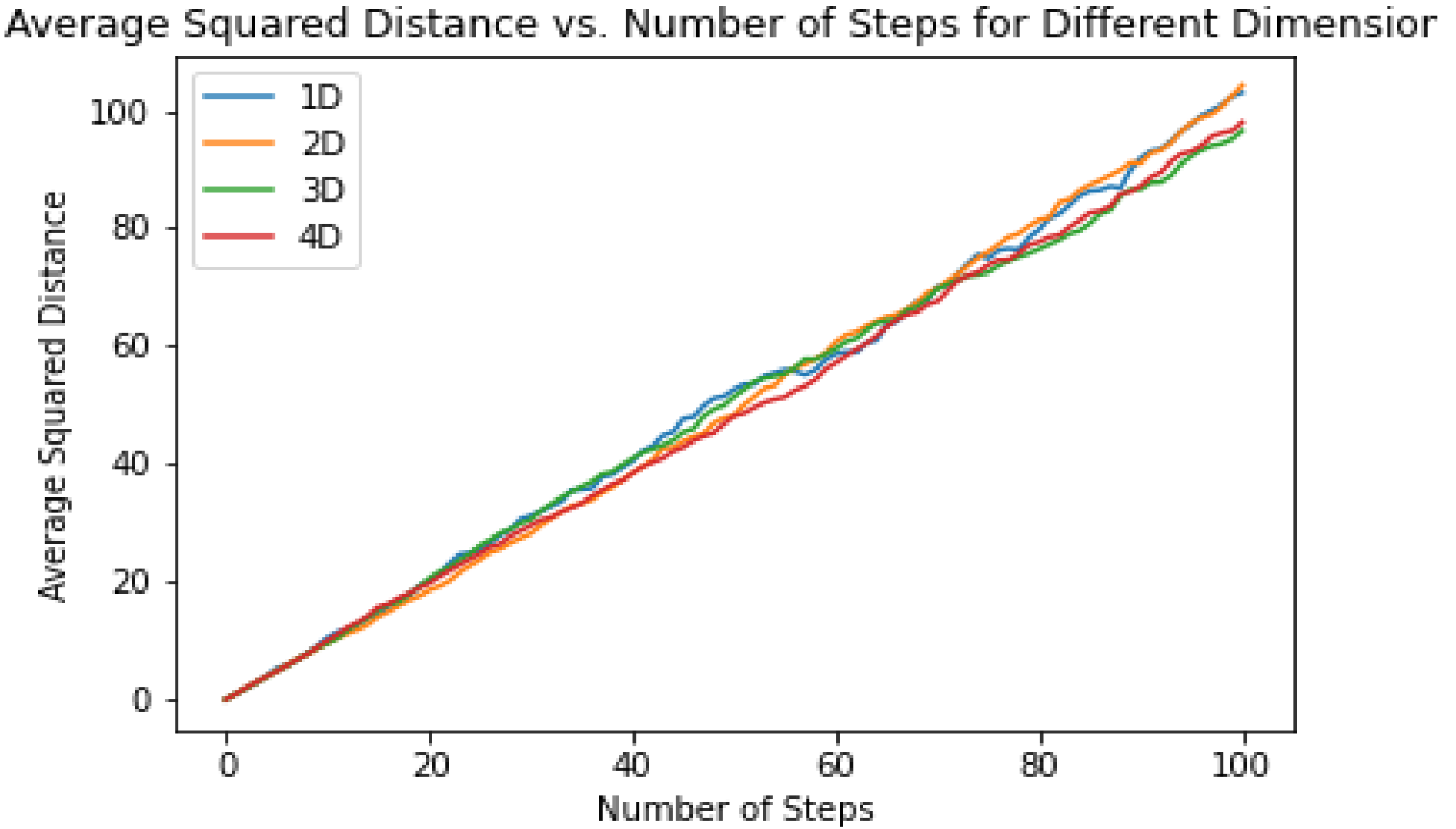

Monte Carlo Integration Error Scaling with Number of Points and Dimensi
Integration error
Number of points
2D
3D
4D
5D
10^{-1}
10^{-2}
10^{-3}
10^{-4}
10^{-5}
10^{1}
10^{2}
10^{3}
10^{4}
10^{5}

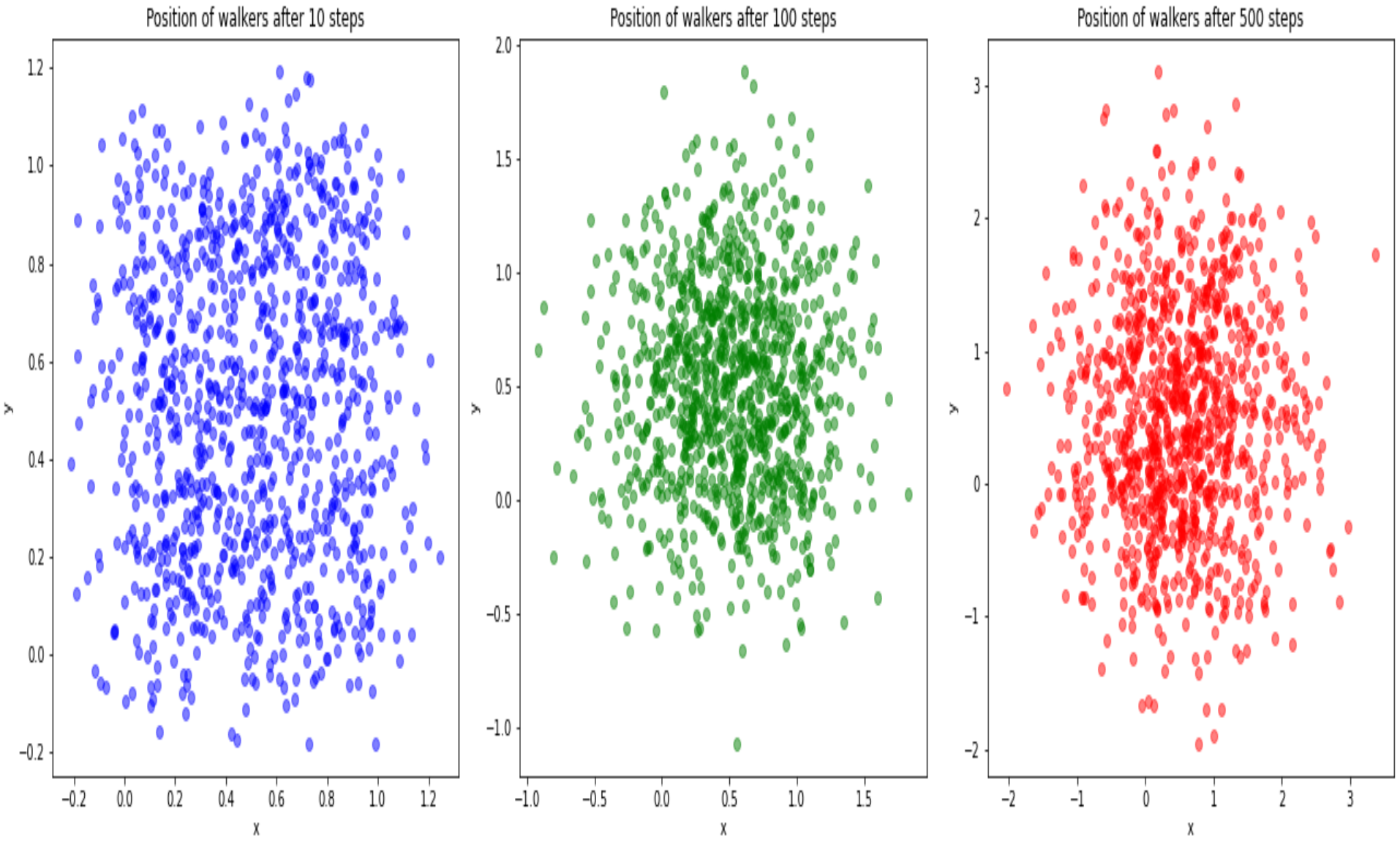

Distribution of Values Generated by genSample()
Sample Distribution
Theoretical PDF
Normalized Frequency
0.00
0.05
0.10
0.15
0.20
0
2
4
6
8
10
x


Comparison of Root Finding Methods
Newton-Raphson
Secant
Bisection
Error (log scale)
10^{-1}
10^{-3}
10^{-5}
10^{-7}
10^{-9}
0
5
10
15
20
25
30
Number of Iterations


Gradient Descent Optimization on Banana Function
eta=0.001
eta=0.0005
eta=0.0001
2.5
2.0
1.5
1.0
0.5
0.0
−0.5
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 Over Time
Average Position
Average Squared Position
Average Position (blue), Average Squared Position (red)
0
200
400
600
800
1000
Steps


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


Position of walkers after 10 steps
Position of walkers after 100 steps
Position of walkers after 500 steps
x
y

AI?