Ps 3 Problem 4

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Abstract

Instead of directly calculating trajectories using loops, you can also choose your random numbers ahead of time and weight them correctly to get the distributions you want.

1 Introduction

Radioactive decay is a random process that is described by exponential decay. You can directly calculate using loops to get a trajectory, or, as done in the code, choose 1000 uniformly selected random numbers, and then weight them so that the distribution is then exponential. This is equivalent.

2 Methods

The code is simple: make an array of uniform random numbers (z), plug them into equation 10.10 in newman ($x = -\frac{ln(1-z)}{\mu}$), then sort and plot them.

3 Results

It look's as expected for an exponential decay.

4 Discussion

There are many ways to simulate things, often times the best way to simulate something is to not even simulate it, it's to do math and understand the problem before head so you dont have to calculate things you already know.

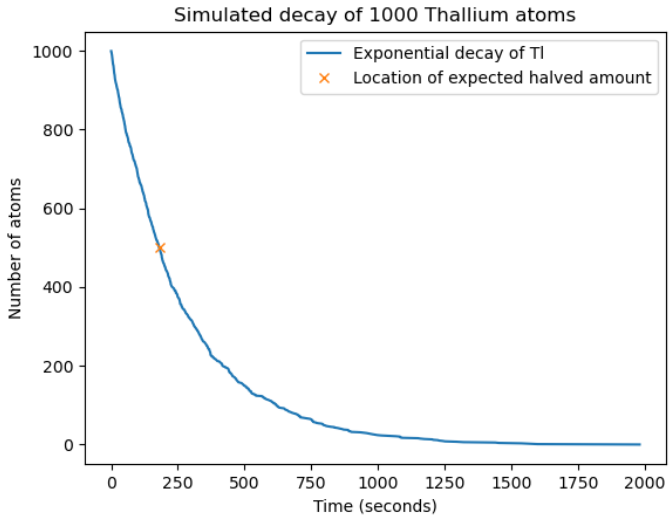

Figure 1: Exponential curves as expected. I added a point at the half life time equal to half the starting number to show it lines up correctly.