

# Advanced Stochastic Processes - Ex. 2

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## 1 Introduction

In this report, I have implemented a Python program to solve problem 3.4 from the textbook. The problem asks us to simulate the monthly random walk path that a stock may follow, given its current price, annual expected return, and standard deviation. I have simulated 10,000 sample paths and also visualized the tree form of all 10,000 possible simulation paths.

## 2 Python Implementation

The python code can be found in the same directory as this report. To obtain a better visualization, It is recommend it to open it using Jupiter notebook.

## 3 Simulation Results

I have simulated 10,000 sample paths and plotted 50 of them. The plot can be seen in Figure 1.

I have also visualized the tree form of all the 10,000 possible simulation paths with the probabilities of specific prices happening. The tree visualization can be seen in Figure 2. The value of each leaf, is the possible path that the stock price can take and the color shows the frequency of that price happening.

The textbook's answer can also be found in Figure 3

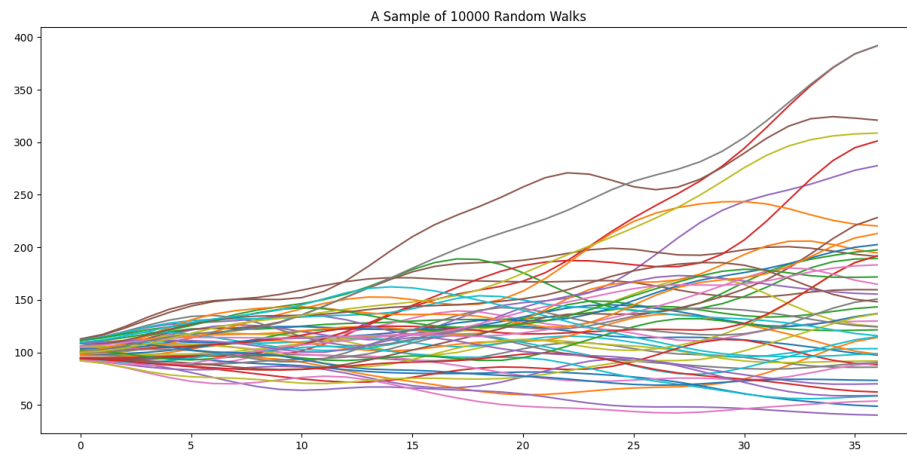


Figure 1: 50 Sample Paths

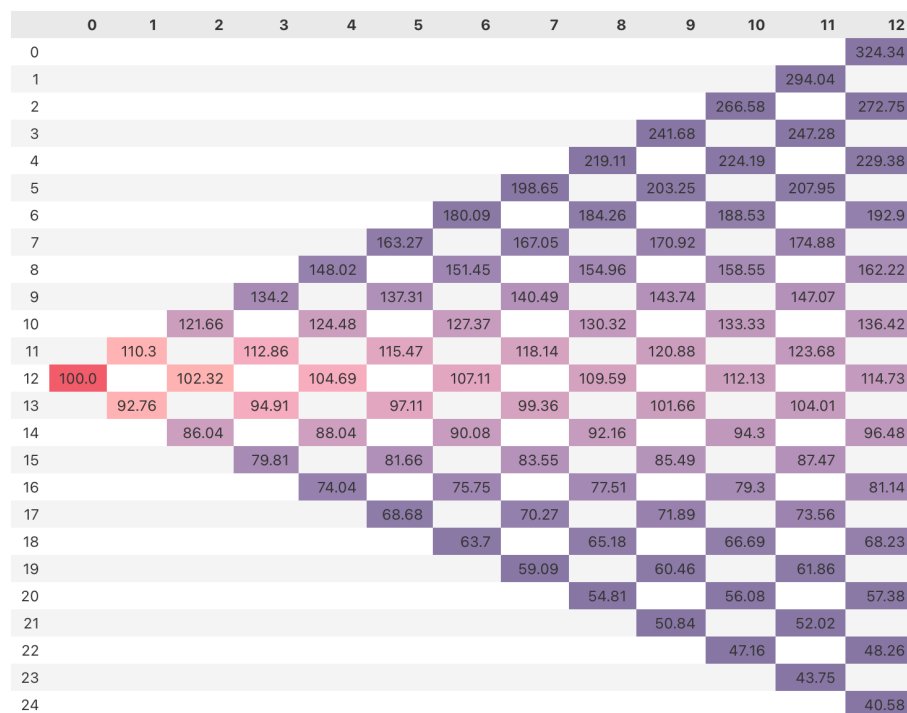


Figure 2: Tree Visualization of All 10,000 Paths (Monthly) with the respected frequency (colors)

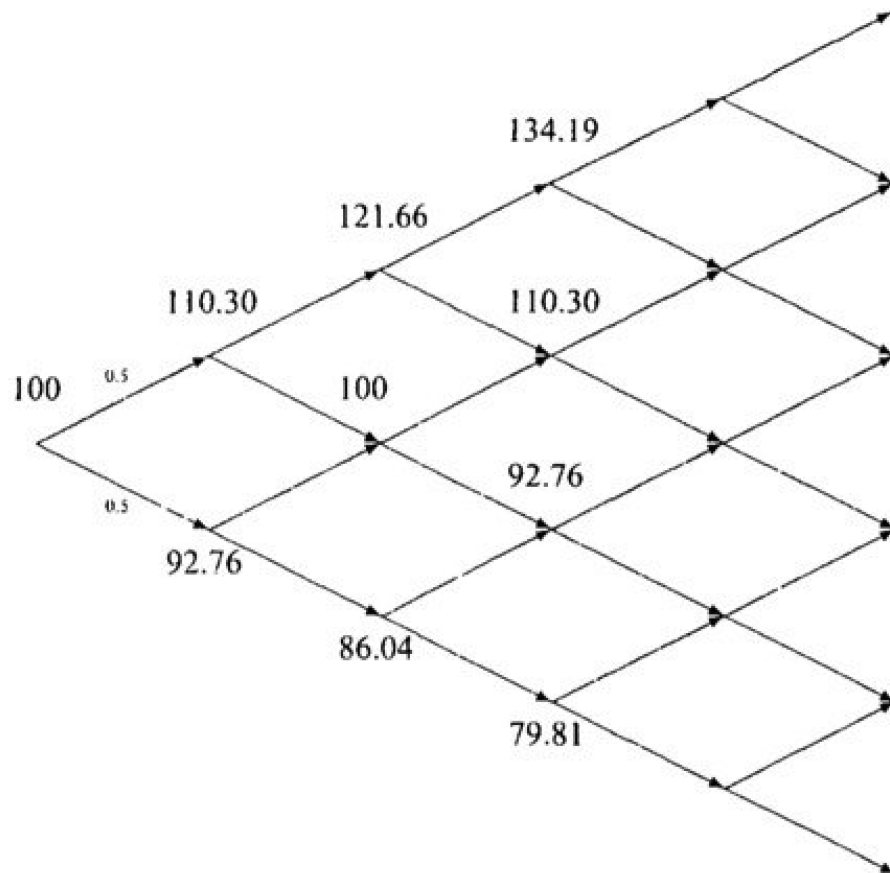


Figure 3: Tree Visualization: From the Textbook