Problem (5-6)

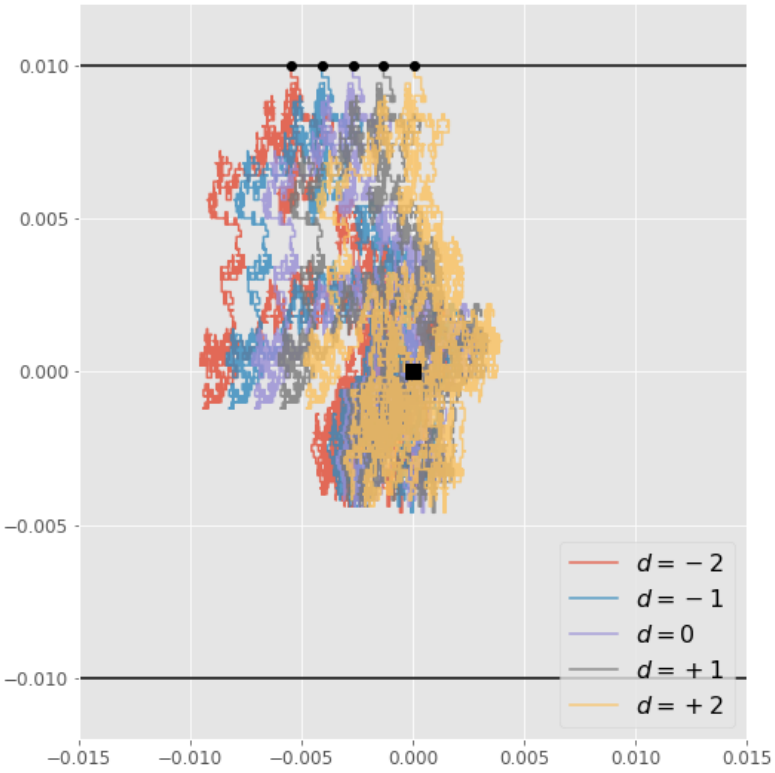
Problem 5

0.0/1.0 point (graded)

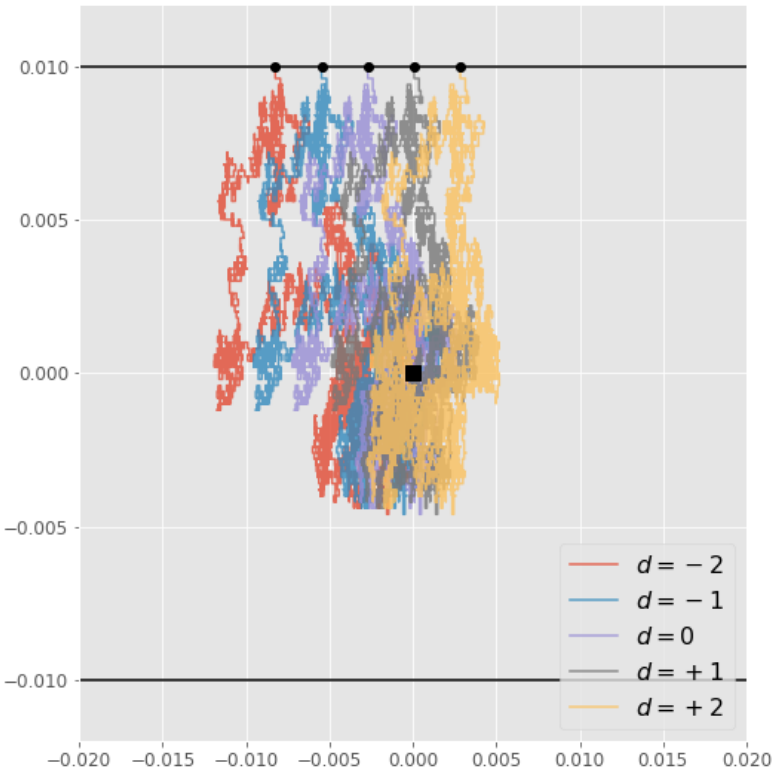
Use the code example introduced in the video to simulate the 2D random walk for one transaction of model 2 (the stochastic dealer model with a memory term). In this case, an extra "drift" or memory term $d\langle \Delta P \rangle_M$ is added to the update rule for the mid-prices $p_i\,(t)$ of the dealers. The constant d determines whether the dealers are trend-followers ($d > 0$) or contrarians ($d < 0$), and $\langle \Delta P \rangle_M$ is a weighted average of the market prices increases $\Delta P = P_{n+1} - P_n$ over the previous M trades. Notice that if $d = 0$, we recover the original model 1 version, without memory.

Use exactly the same parameters as in the video, but take $d = -2, -1, 0, 1, 2$, to simulate both contrarians and trend-followers. For comparison purposes, be sure to initialize the randon number generator using the same seed for all the simulations. Plot the random walk in 2D space $\left(A\,(t) = \frac{1}{2}(p_1\,(t) + p_2\,(t))\,, D\,(t) = p_1\,(t) - p_2\,(t)\right)$. Which of the following is the closest to what you obtained?

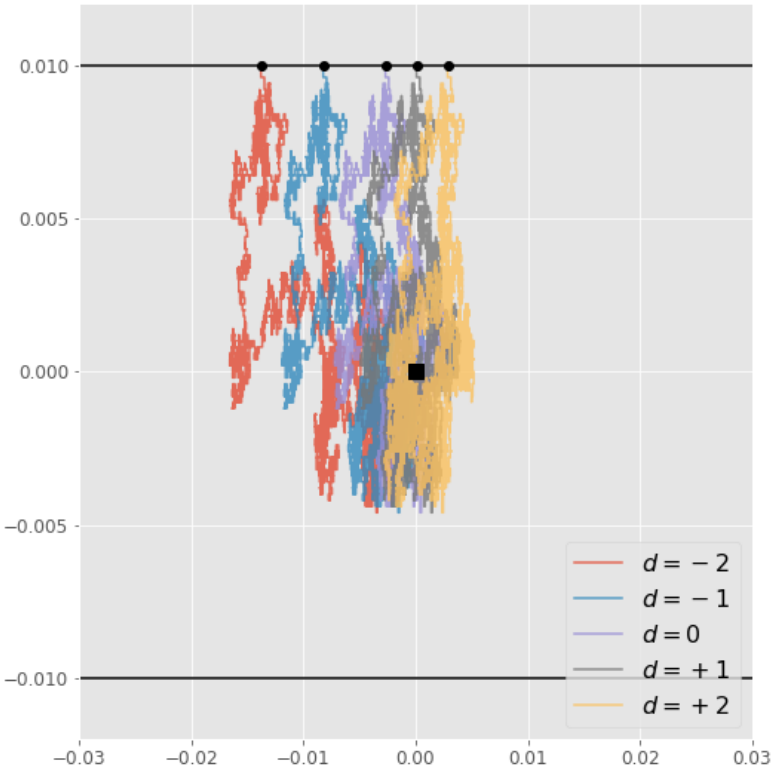
G31


0.010
0.005
0.000
−0.005
−0.010
−0.015
−0.010
−0.005
0.000
0.005
0.010
0.015
$d=-2$
$d=-1$
$d=0$
$d=+1$
$d=+2$

G32


0.010
0.005
0.000
−0.005
−0.010
−0.020
−0.015
−0.010
−0.005
0.000
0.005
0.010
0.015
0.020
$d=-2$
$d=-1$
$d=0$
$d=+1$
$d=+2$

G33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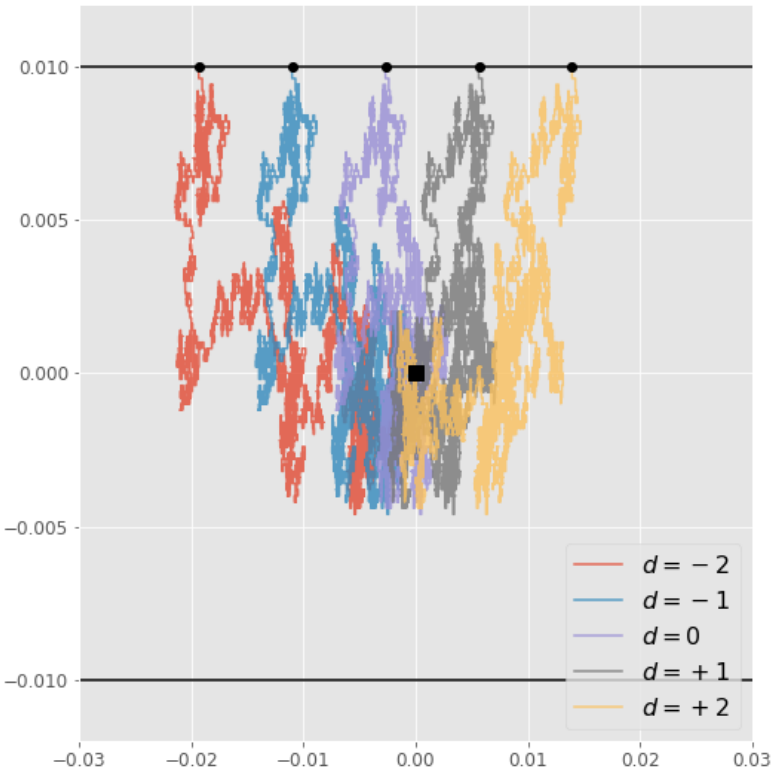
0.005
0.000
−0.005
−0.010
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
$d=-2$
$d=-1$
$d=0$
$d=+1$
$d=+2$

G34


0.010
0.005
0.000
−0.005
−0.010
−0.03
−0.02
−0.01
0.00
0.01
0.02
0.03
$d=-2$
$d=-1$
$d=0$
$d=+1$
$d=+2$

- G31
- G32
- G33
- G34

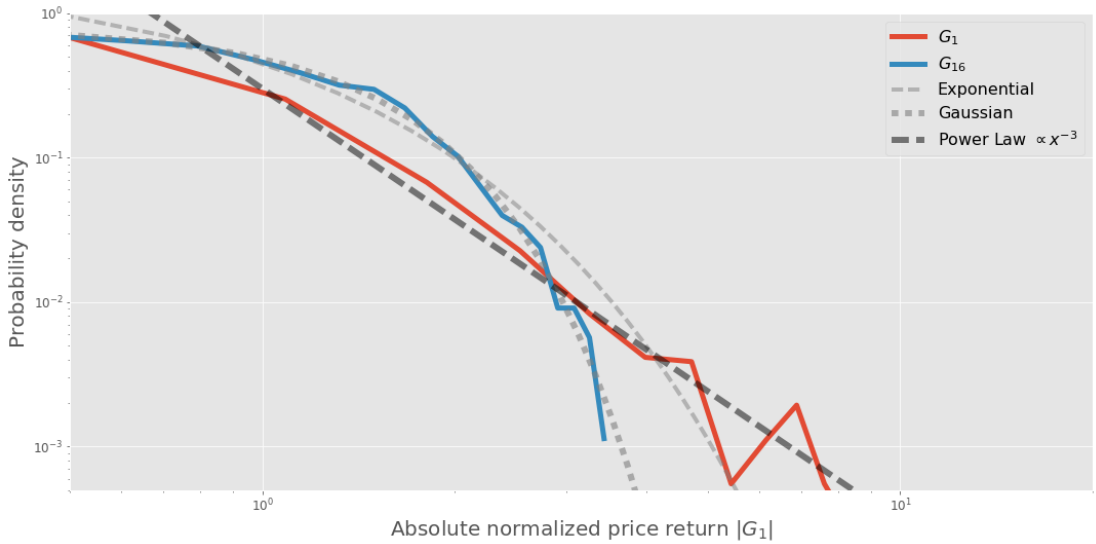
Submit You have used 0 of 2 attempts

Problem 6

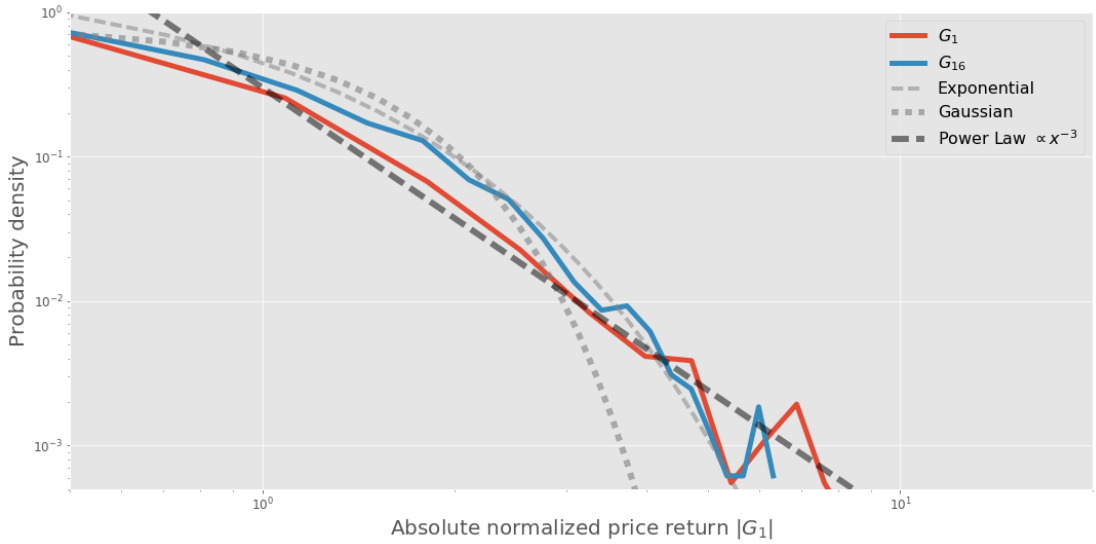
0.0/1.0 point (graded)

Use the code example and data (model2.txt) introduced in the video to calculate the probability distribution function of the absolute price return G_τ for two different values of the time delay, $\tau = 1$ and $\tau = 16$. As a guide to the eye, you should also plot the exponential, Gaussian, and power-law distributions. Which of the following graphs is the closest to what you obtained (When generating the histogram, use $n = 20$ bins for comparison)?

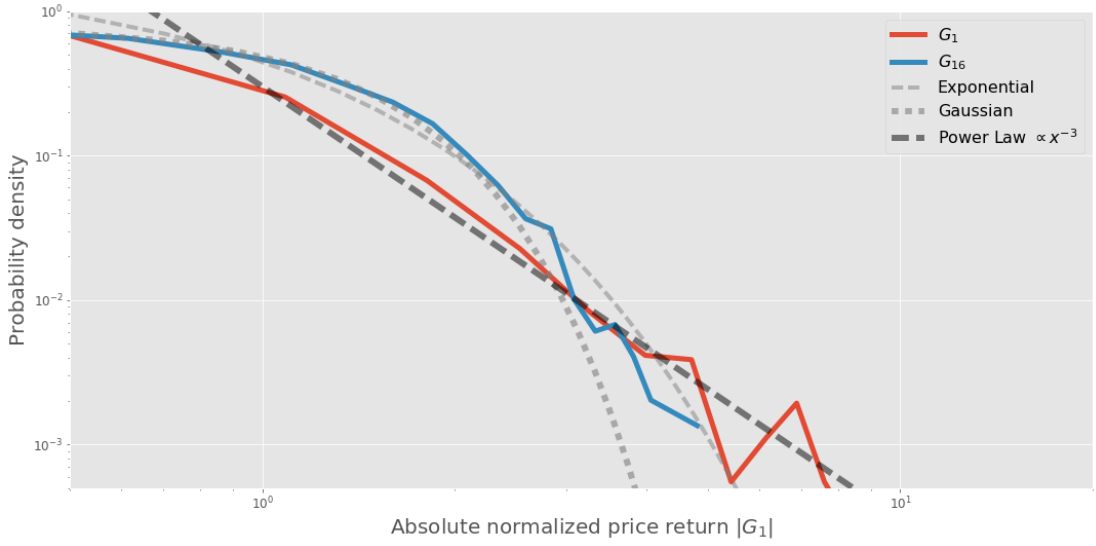
G41



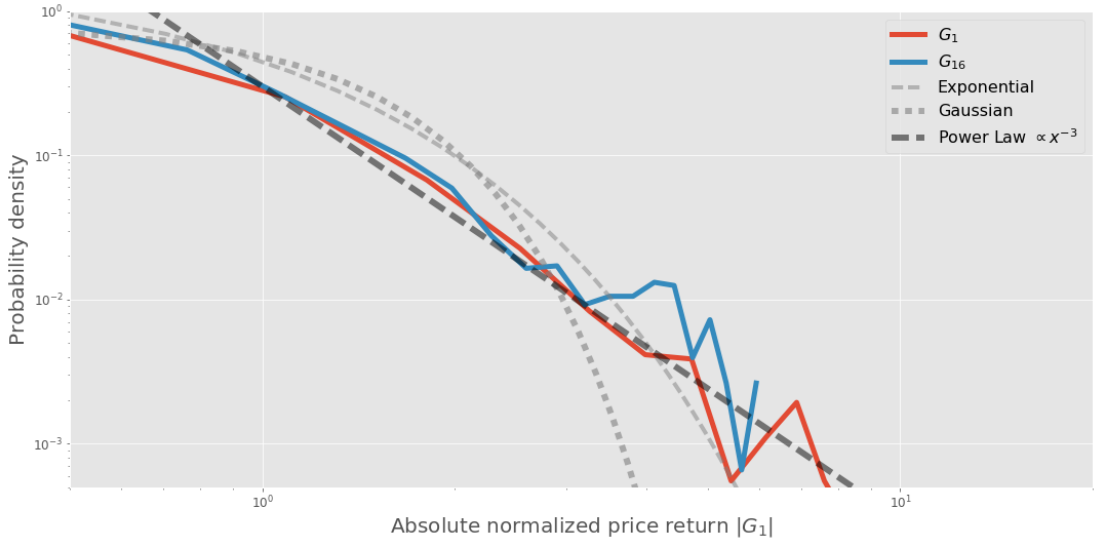
G42


G_1
G_{16}
Exponential
Gaussian
Power Law $\propto x^{-3}$
Probability density
Absolute normalized price return $|G_1|$

G43


G_1
G_{16}
Exponential
Gaussian
Power Law $\propto x^{-3}$
Probability density
Absolute normalized price return $|G_1|$

G44


G_1
G_{16}
Exponential
Gaussian
Power Law $\propto x^{-3}$
Probability density
Absolute normalized price return $|G_1|$

- G41
- G42
- G43
- G44

Submit You have used 0 of 2 attempts