

MATH 512 - Project 3

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Question 1 Overview

- Let W_t be a standard Wiener process, with drift parameter zero and variance parameter $\sigma^2 = 1$.
- We divide the interval $[0, 2]$ into L subintervals $[t_i, t_{i+1}]$, where $t_i = i\delta t$ and $\delta t = 2/L$.
- Let $W_i = W(t_i)$ and $\delta W_i = W_{i+1} - W_i$.
- We verify numerically that:
 - $\sum_{i=0}^{L-1} |\delta W_i|$ is unbounded as δt goes to zero.
 - $\sum_{i=0}^{L-1} \delta W_i^2$ converges to 2 in probability as δt goes to zero.

Question 1 Response

Refer to Figure 1

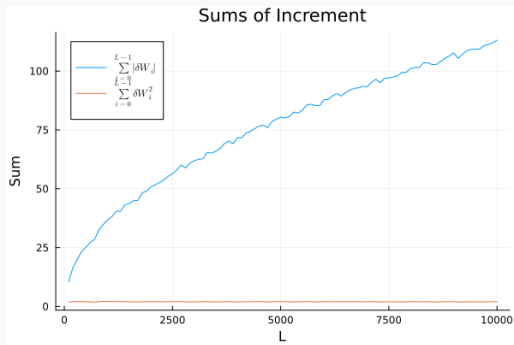


Figure: Stochastic Plots

Notice that as the L parameter increases, the $|\delta W_i|$ term is unbounded while δW_i^2 converges to 2 in probability.

Question 2a

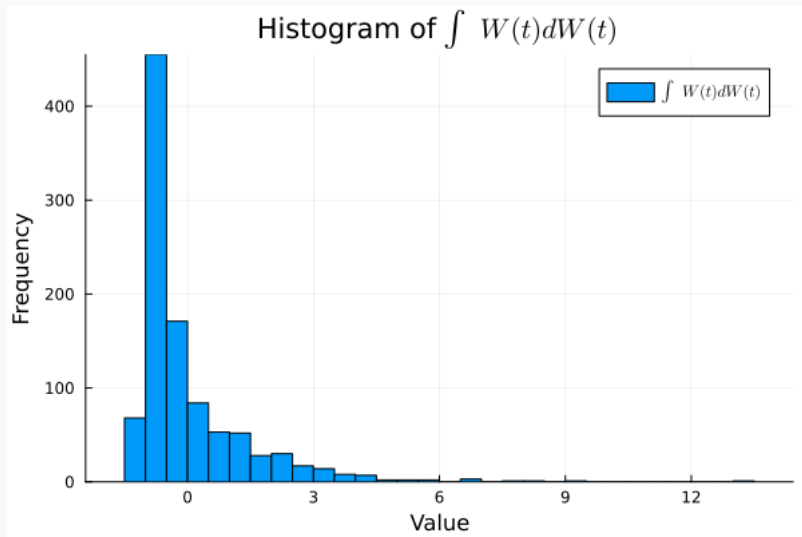


Figure: 2a

Question 2b

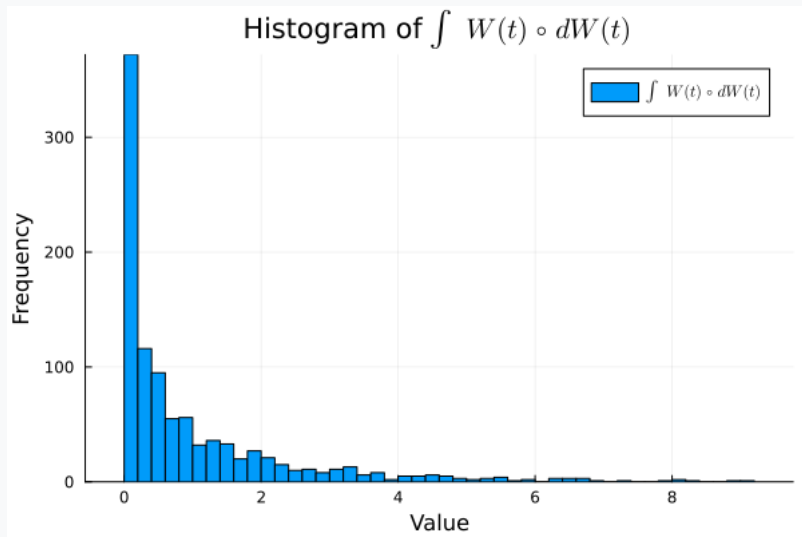


Figure: 2b

Question 2c

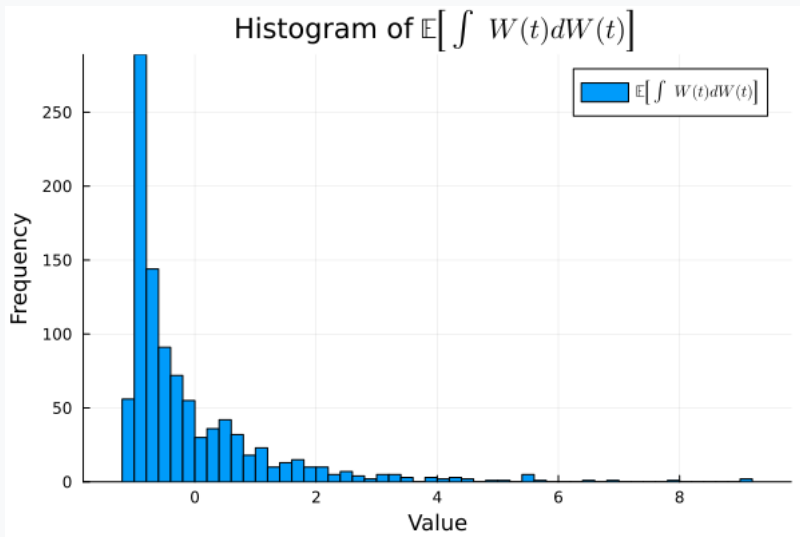


Figure: 2c

Question 2d

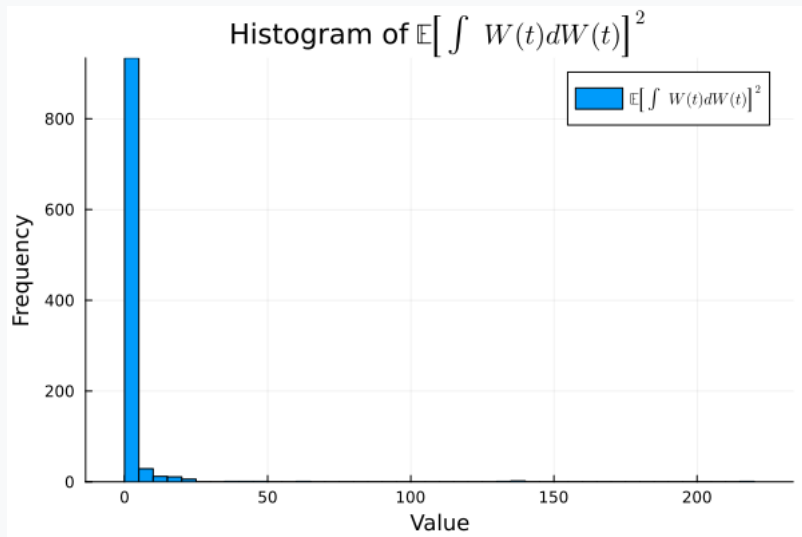


Figure: 2d

Question 2e

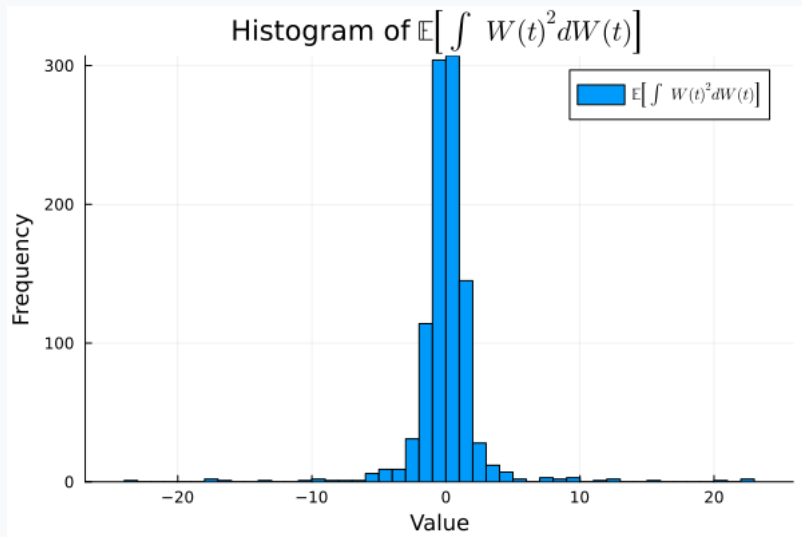


Figure: 2e

Question 2f

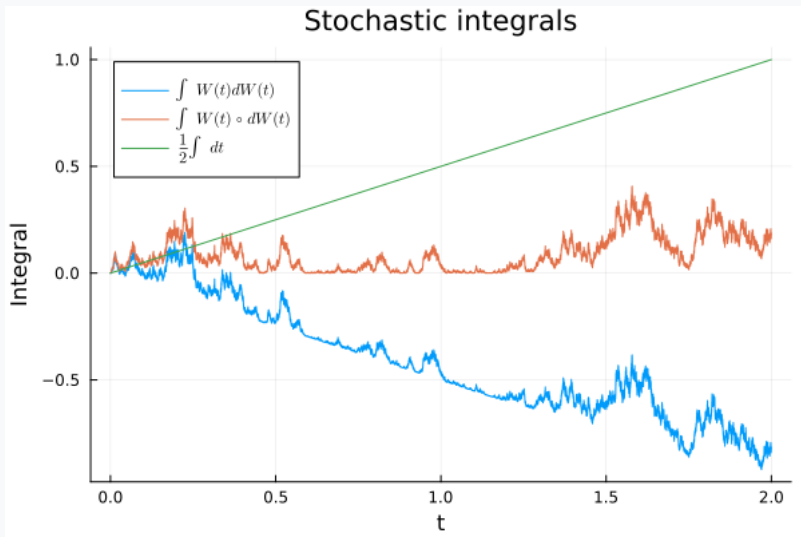


Figure: 2f

Questions?