1. $\lim_{n\to\infty} \sum_{i=0}^{n-1} \exp\left(-\left(\frac{i}{n}\right)^2\right)\left(B_{\frac{i+1}{n}} - B_{\frac{i}{n}}\right)$

2. $\lim_{n\to\infty} \sum_{i=0}^{2n-1}$

3. $B_{\frac{i}{n}}\left(B_{\frac{i+1}{n}} - B_{\frac{i}{n}}\right)$

1) $\int_0^{0.5} \sin(B_s)\, dB_s$.

2) $I_t = \int_0^t \sin(s)\, dB_s$)

$\in [0, t$

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Ex Simulation

Step 1) simulate a path of BM over $[0, 1]$

Step 2) based on this path, simulate the corresponding path of $(I_t)_{0 \le t \le 1}$

Repeat step 1 & 2 a large number of time and investigate the distribution of I_1

Similar question but replace the integrand by $\sin(B_s)$

$$I_1 = \int_0^1 \sin(B_s)\, dB_s$$