Assignment 11

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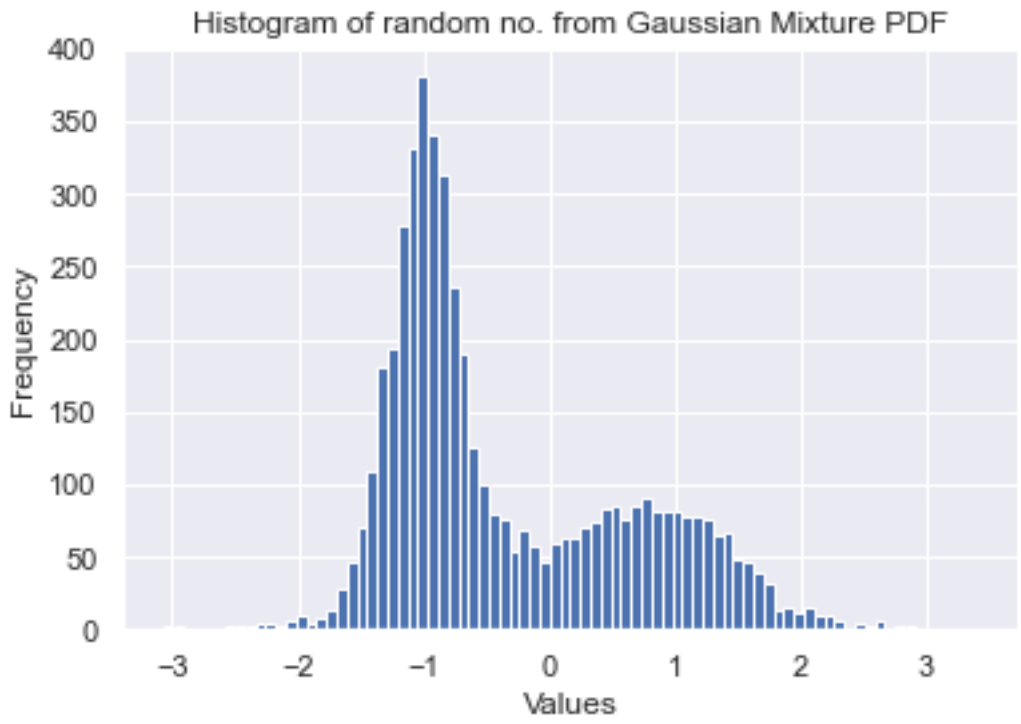
Question 1

Mixture PDF = f(x) = $\sum_{k=1}^{3} \pi_i \frac{1}{\sigma_i} \phi\left(\frac{x-\mu_i}{\sigma_i}\right) = \sum_{k=1}^{3} \pi_i f_i(x)$

where f_i is PDF of N (μ_i, σ_i^2) and
$(\mu_1, \mu_2, \mu_3) = (-1,0,1)$
$(\sigma_1, \sigma_2, \sigma_3) = (1/4,1,1/2)$
$(\pi_1, \pi_2, \pi_3) = (1/2, 1/3, 1/6)$
Average of generated random numbers = -0.33683669692866525

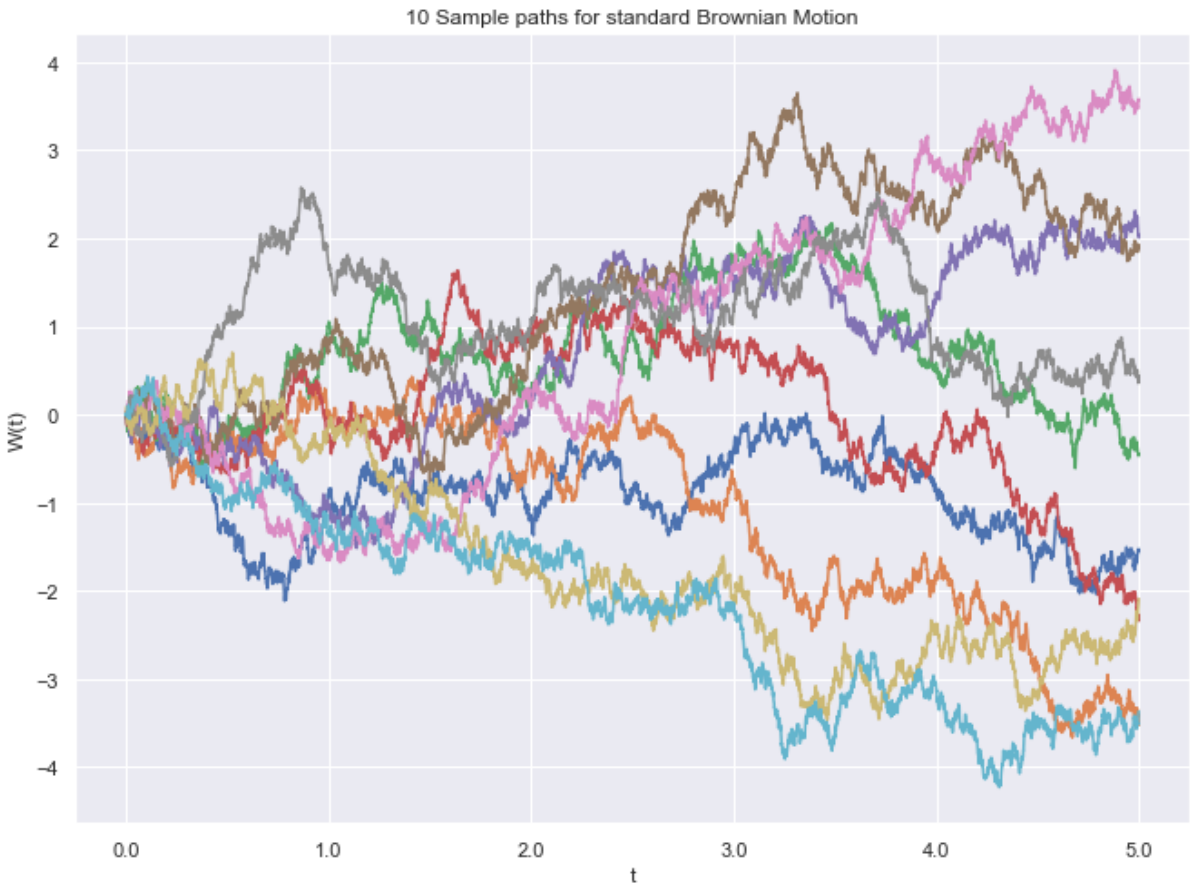


Question 2

Taking $t_i = i/1000$ generated W(t) for time interval [0,5] from the following formula-

$$W(t_{i+1}) = W(t_i) + \sqrt{t_{i+1} - t_i}\ Z_{i+1}$$

where Zi are independent standard normal and W (0) = 0
Estimated values of E [W (2)] and E [W (5)] are given below-
E [W (2)] = -0.14948703718606832
E [W (5)] = -0.5467512325552152



Question 3

Taking t_i = i/1000 generated X(t) for time interval [0,5] from the following formula-

$$X(t_{i+1}) = X(t_i) + \mu\,(t_{i+1} - t_i) + \sigma\sqrt{t_{i+1} - t_i}\;\; Z_{i+1}$$

where Zi are independent standard normal and X (0) = 5 and μ = 0.06 and σ = 0.3.
Estimated values of E [X (2)] and E [X (5)] are given below-
E[X(2)] = 4.904035253073413
E[X(5)] = 4.9971940234649415


10 Sample paths for Brownian Motion X(μ,σ^2)
5.5
5.0
4.5
4.0
W(t)
0.0
1.0
2.0
3.0
4.0
5.0
t