1 Effective Sample Size

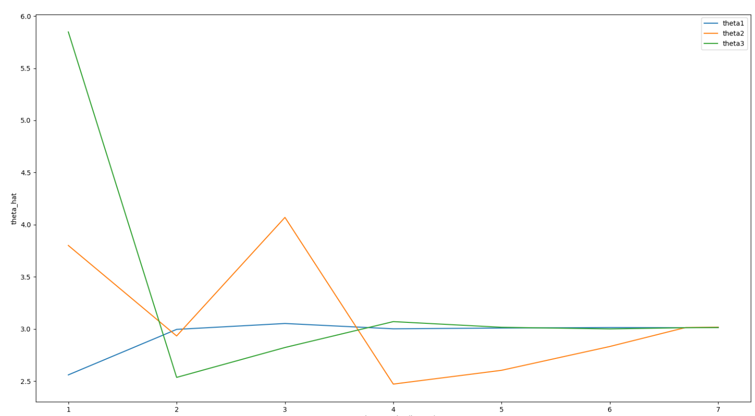
1.1 Computing θ

In this section, we examine the effectiveness of picking different $g(x)$ to compute $\theta = \int \sqrt{x^2 + y^2}\pi(x, y)dxdy$

- For $\hat{\theta}_1$, we will draw from $\pi(x, y)$ directly.
- $\hat{\theta}_2$ will be drawn from g(x,y) a bivariate gaussian with parameters $\mu = (0, 0)$ and $\sigma_0 = 1$ We assume independence between x and y.
- $\hat{\theta}_3$ will be drawn from g(x,y) a bivariate gaussian with parameters $\mu = (0, 0)$ and $\sigma_0 = 1$ We assume independence between x and y.

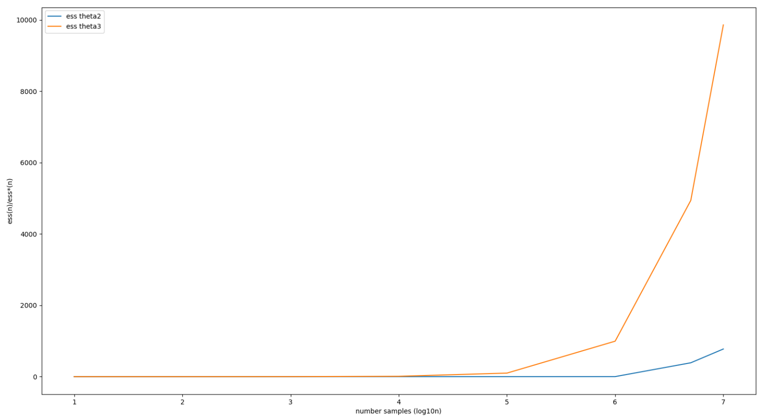
Comparing between $\hat{\theta}_2$ and $\hat{\theta}_3$, I believe that $\hat{\theta}_3$ will converge more quickly to θ. This is because both models are drawn from a distribution whose mean is not the true mean $\mu = (2, 2)$ meaning the masses of g and pi are not distributed in the same points. It is more likely for us to draw samples close to this the mass of π from g_3 because of the larger standard deviation.

We clearly see this when plotting the estimated θ for different g distributions. We see that $\hat{\theta}_3$ converges to $\hat{\theta}_1$ baseline faster than $\hat{\theta}_2$ as n increases in the log sample plot in the next page.



1.2 effective samples size

I was unsure on how to interpret the $ess*(n)$ My understanding was that was the ess for the n_2 and n_3 when θ_2 and θ_3 converged to θ_1. When normalizing ess for θ_2 and θ_2 with the defined $ess*(n_2)$ and $ess*(n_3)$ respectively we saw that the effective sample size of θ_3 increased much faster than θ_2 which furthered my prediction that the former is a better sampler.



2 SAW

2.1 Total Number of SAWS

- Design 1 was attempting to d . At $M = 10^7$, the estimated number of SAW is
- Design 2 accounted for the fact . At $M = 10^7$, the estimated number of SAW is
- Design 3 was a decaying epsilon so . At $M = 10^7$, the estimated number of SAW is

We plot the number of estimated SAW's against M. Here we see that

2.2 Total Number of SAWS from corner to corner

Here, I used the same sampling method and P(x) as above except I divided by number of attempts. I also should note that I only recorded paths that ENDED at (n,n) meaning there were no more valid moves. For each method respectively, I got the following

- Design 1, at $M = 10^7$, the estimated number of SAW is
- Design 2, at $M = 10^7$, the estimated number of SAW is
- Design 3, at $M = 10^7$, the estimated number of SAW is