Ph21 Assignment 5

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Part 1

In this assignment I will use dynesty for MCMC sampling. Tackling the coin tossing problem, both uniform and gaussian distributions are tested, with different chain lengths and number of chains. I also tested the results for different values of n.

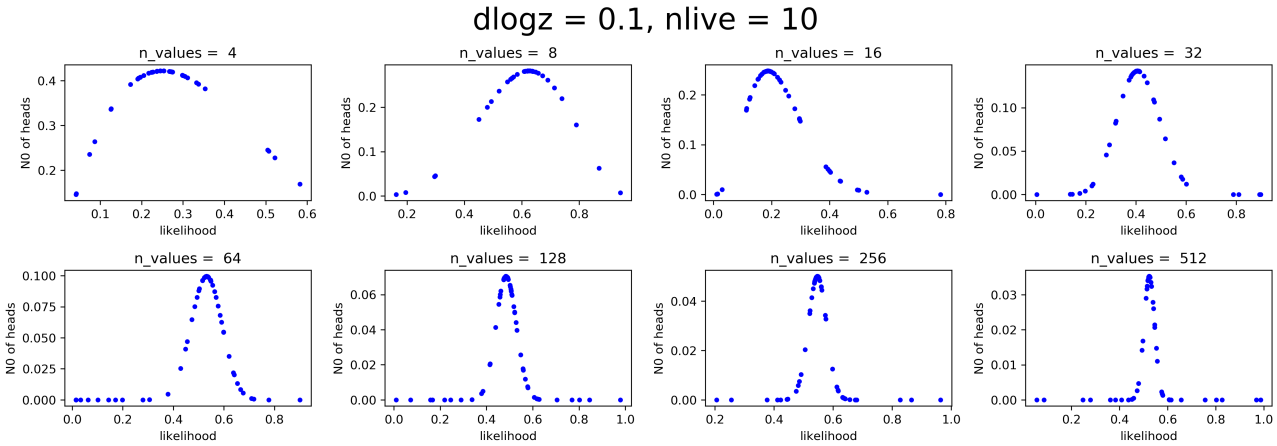

Figure 1: Uniform Posterior distributions for multiple N.

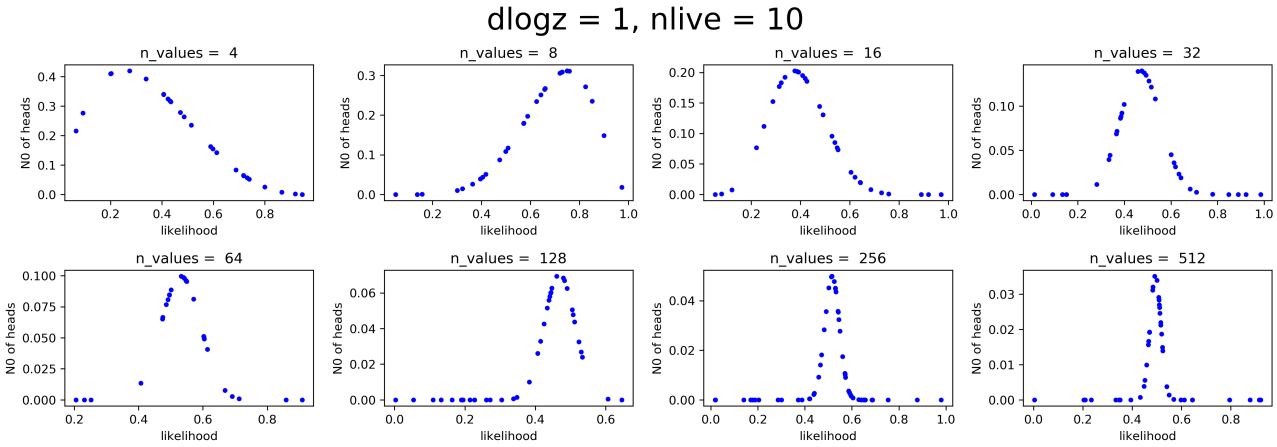

Figure 2: Uniform Posterior distributions for multiple N.

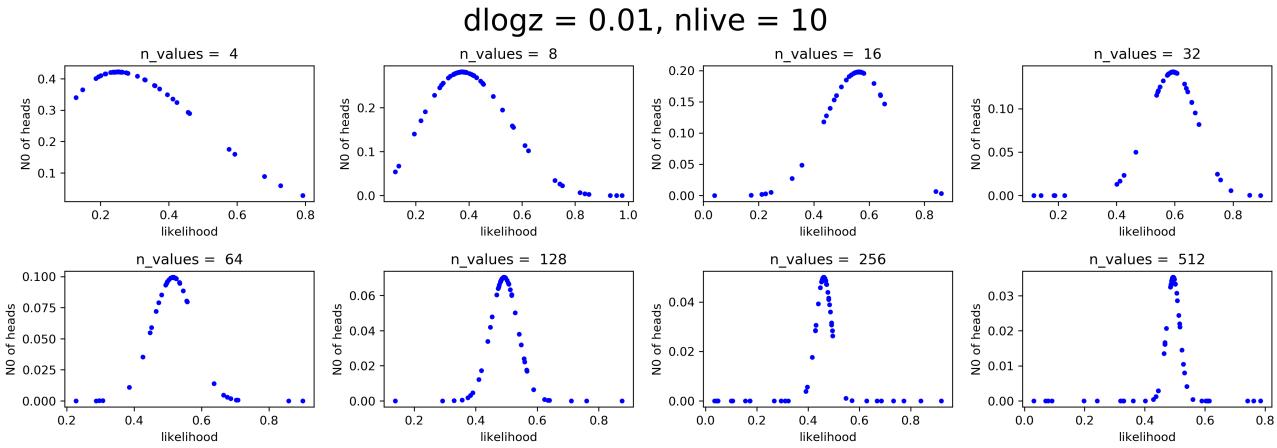

Figure 3: Uniform Posterior distributions for multiple N.

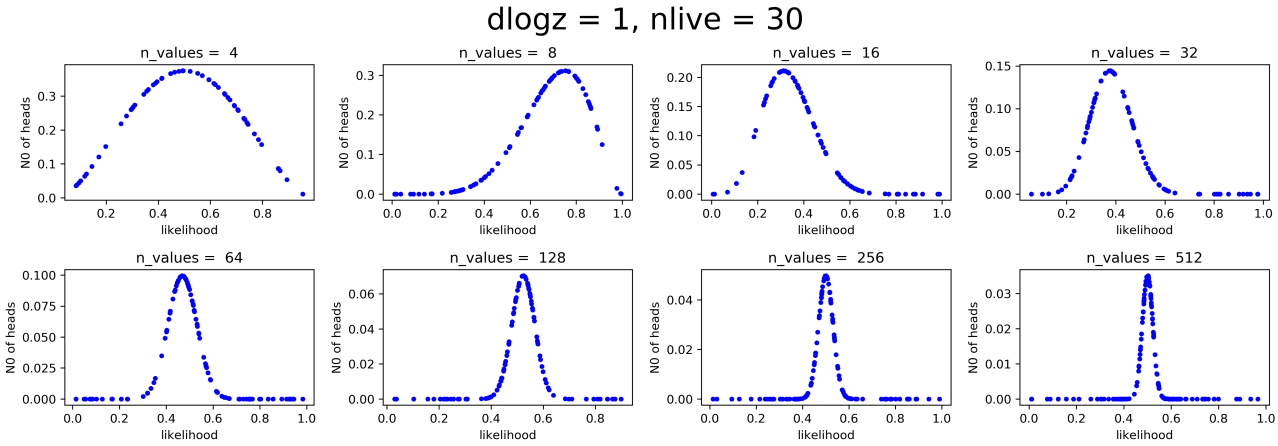

Figure 4: Uniform Posterior distributions for multiple N.

Now we test the gaussian distributions with diffrent μ and σ.

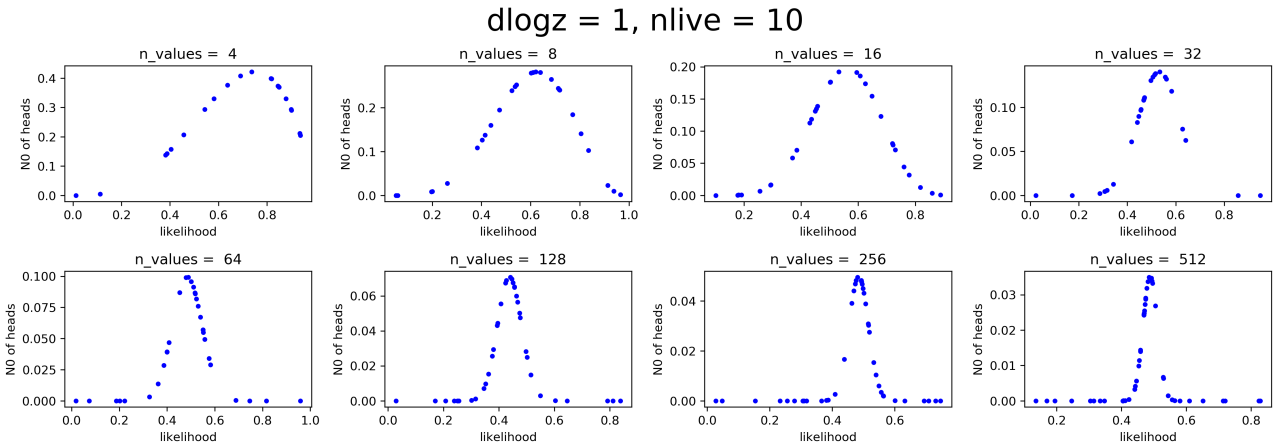

Figure 5: Gaussian Posterior ($\mu = 0, \sigma = 0.1$) distributions for multiple N.

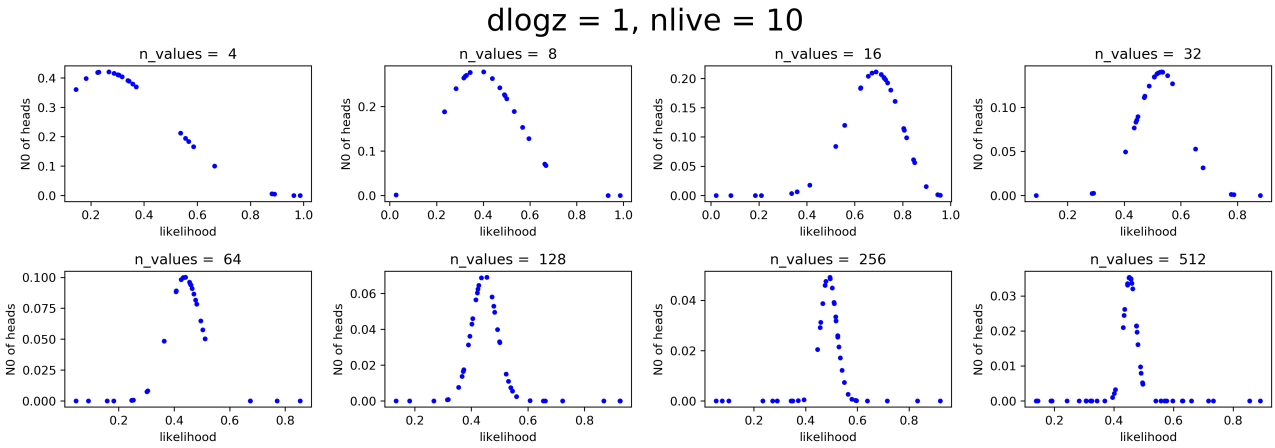

Figure 6: Gaussian Posterior ($\mu = 0.5, \sigma = 0.2$) distributions for multiple N.

Part 2

In this section we investigate the lighthouse problem. First we assume we don't know β or α.

The following plots were produced with $\alpha = 0$ and $\beta = 3$. Next we assign the Interloper to true.

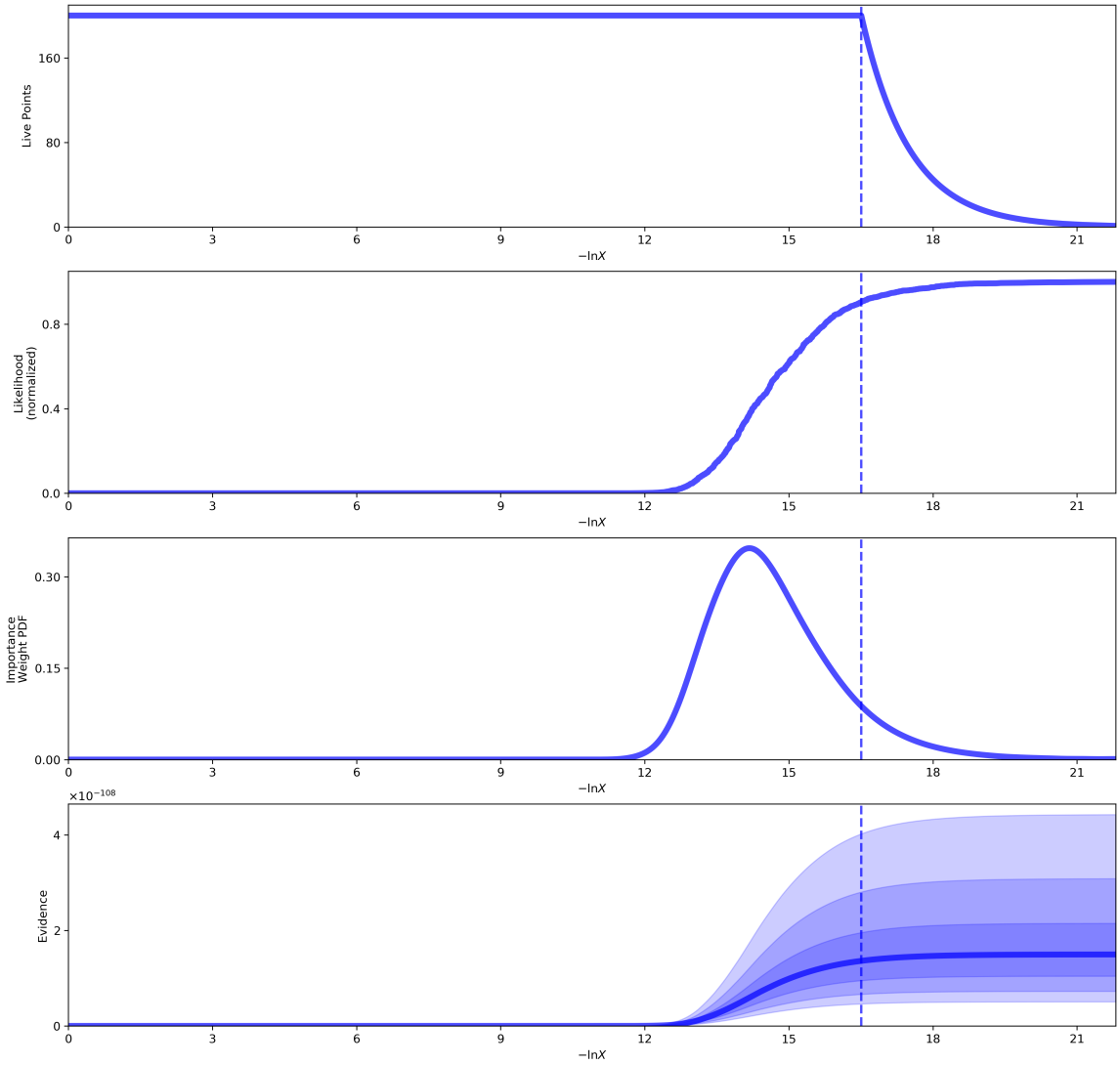

Figure 7: Interloper = False

As we can see the MCMC can spot the interloper.

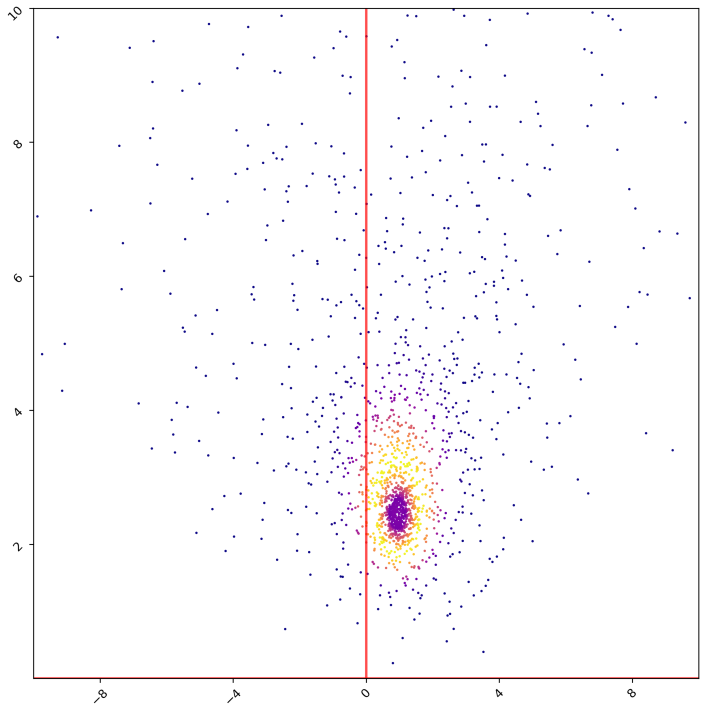

Figure 8: Interloper = False

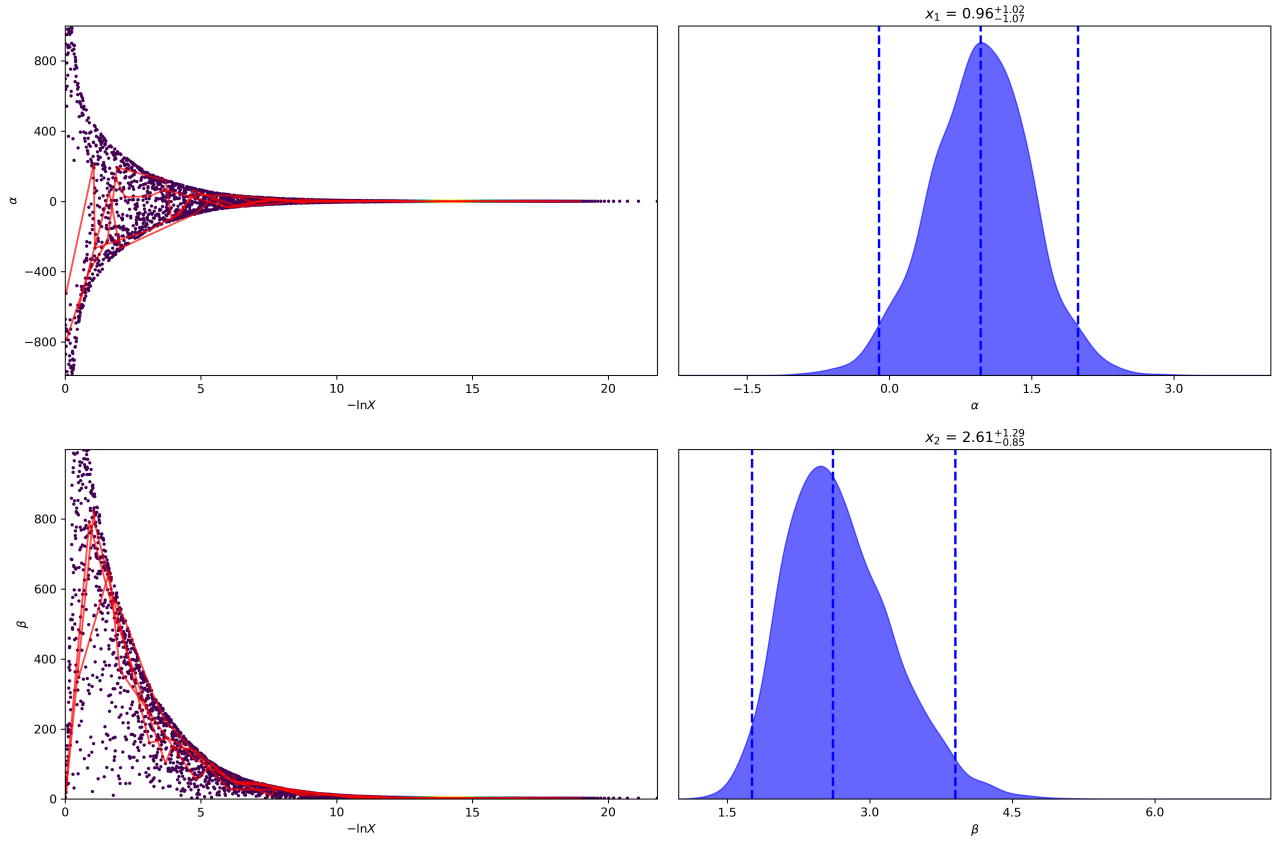

Figure 9: Interloper = False

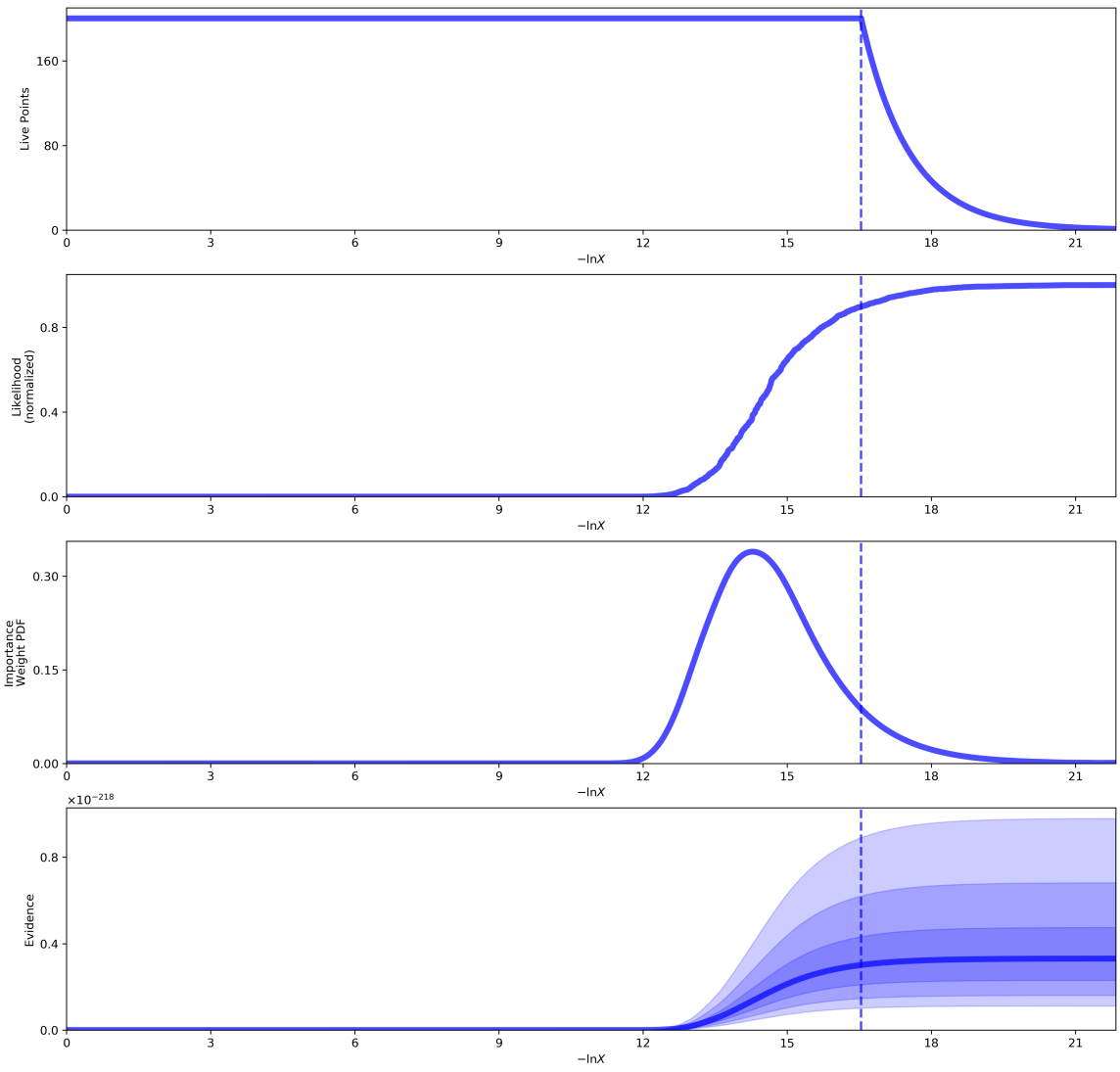

Figure 10: Interloper = True

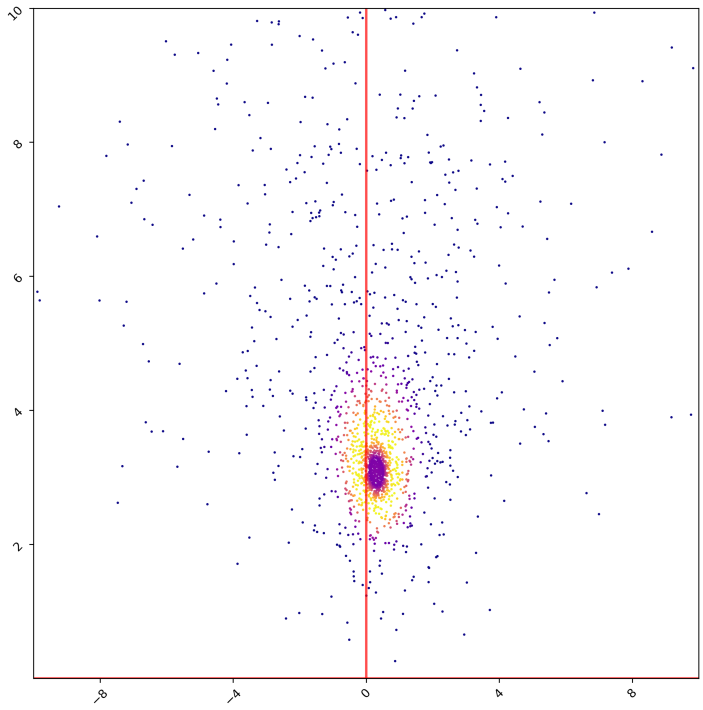

Figure 11: Interloper = True

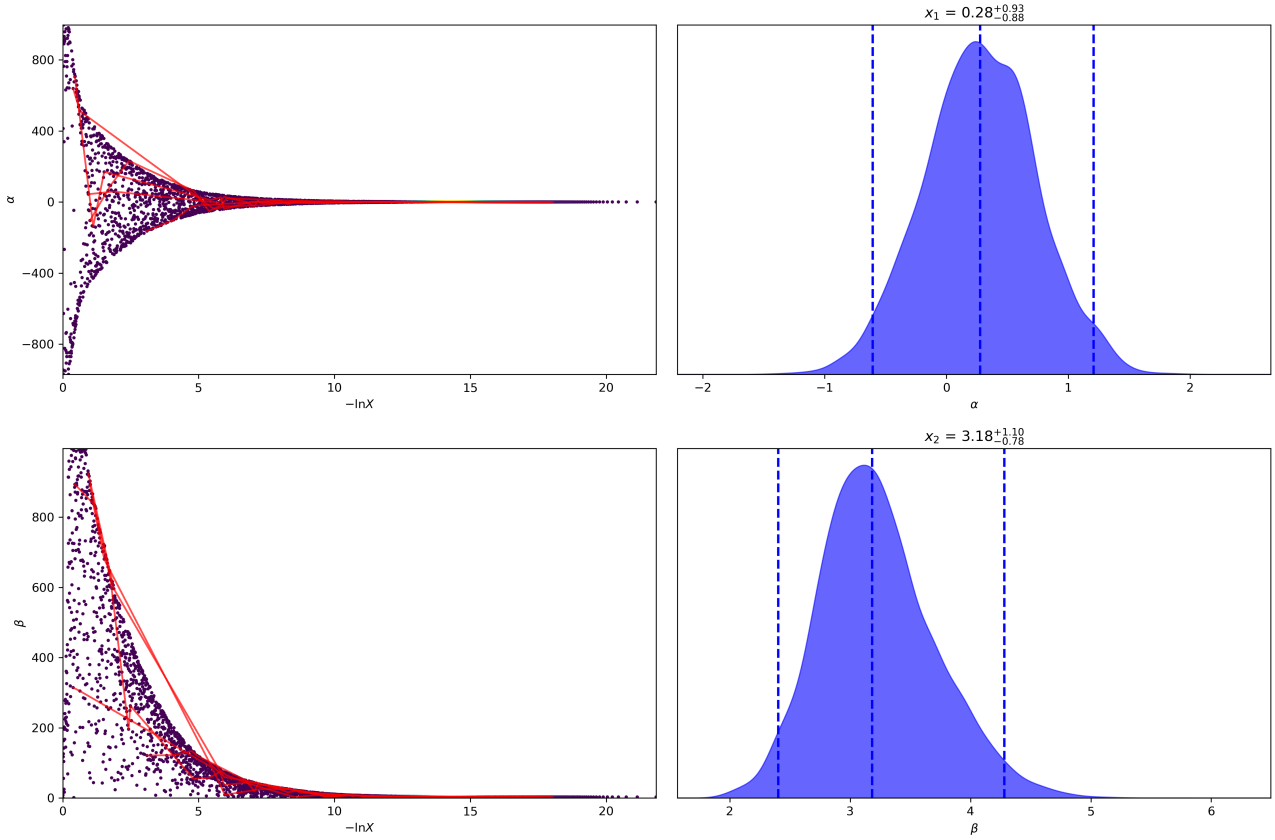

Figure 12: Interloper = True