Simulation

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Assignment 7

(1) (a) We implement Random Walk with q being the multivariate Normal distribution. Even though the tails are thin, it will not be a problem for Random Walk. The algorithm is implemented as in the default case, there is nothing fancy going on here.

(b) Like we mentioned before Normal has thin tails so it won't be a good proposal function for Independent Metropolis. We choose the multivariate Laplace to be the proposal distribution, but because its complicated we take each component from the basic Laplace distribution. Then, the formula for the ratio is: $\frac{p(Y)\cdot q(X_1)\cdot q(X_2)}{p(X)\cdot q(Y_1)\cdot q(Y_2)}$, where q is the basic Laplace

After both algorithms are complete we plot a QQ-Plot for X1 and X2 to prove that both algorithms have samples from the same distribution.

(2) (a) We use $q: \begin{cases} q_1: \text{Normal} \\ q_2: \text{Uniform } [x-0.005, x+0.005] \end{cases}$

as a proposal distribution and the rest of the algorithm is identical

(b) For the same reasons as mentioned in (1) we change the Normal distribution with Laplace. In this case we will do it only for 1 component since for the other we will maintain the Uniform