This is a quick summary of the PDF Gilks 1992 that described the process of Adaptive-Rejection Sampling. I thought this may be easier to reference as it only includes the necessary information.

Overview

In short, these are the steps for sampling from a univariate log-concave $f(x)$:

1. Find an enveloping function above log $f(x)$ using tangents on points in log $f(x)$.

2. Find a squeezing function below log $f(x)$ using lines connecting these points.

3. With each acceptance of a point during sampling, update these functions.

Formulas

See PDF or R code for calculations.

Process

0.0.1 Initialization Step

Choose k x_i's. If $f(x)$ is unbounded on the left, choose x_1 so $h'(x_1) > 0$. If $f(x)$ is unbounded on the right, choose x_k so $h'(x_k) < 0$. Calculate $u_k(x)$, $s_k(x)$, and $l_k(x)$.

0.0.2 Sampling Step

1. Sample x^* from $s_k(x)$.

2. Sample w from $Unif(0, 1)$.

3. If $w \leq exp\{l_k(x^*) - u_k(x^*)\}$, accept x^*. Otherwise,

4. Evaluate $h(x^*)$ and $h'(x^*)$.

5. If $w \leq exp\{h(x^*) - u_k(x^*)\}$, accept x^*. Otherwise, reject x^*.

0.0.3 Updating Step

If $h(x^*)$ and $h'(x^*)$ were evaluated in the sampling step, add x^* to original x_i's, sort the x_i's, reconstruct $u_{k+1}(x)$, $s_{k+1}(x)$, and $l_{k+1}(x)$, increment k, and repeat process until n points have been sampled.