

Adaptive-Rejection Sampling

Description

ars approximates a random sample from a user-defined log-concave distribution function.

Usage

```
ars(f, n, showg = FALSE, upperB = Inf, lowerB = -Inf)
```

Arguments

f	A log-concave distribution function
n	A positive integer, the number of sampled points to generate
showg	TRUE or FALSE; TRUE generates a plot of the function, hulls, and tangent points
upperB	The upper bound of the distribution function
lowerB	The lower bound of the distribution function

Details

This function performs adaptive rejection sampling to estimate a random sample from the user defined distribution. This relies on the distribution being log-concave; errors will be generated if the distribution is not log-concave.

showg is an optional flag to plot the distribution f, the upper and lower shell functions generated by ars, and the points tangent to f that have been evaluated for the shell functions.

The number of sample points generated at a given iteration scales as the function progresses to prevent wasted computation.

Value

A vector of length n with elements drawn from the estimated sampling distribution

References

Gilks, W.R and Wild, P. (1992) *Adaptive Rejection Sampling for Gibbs Sampling*. Wiley.

Gilks, W.R and Wild, P. (1993) *Algorithm AS 287: Adaptive Rejection Sampling from Log-Concave Density Functions*. Applied Statistics vol 42 issue 4.

Examples

```
# Define the distribution to sample from
f <- function(x) {
  dnorm(x)
}

#Approximate a sample from the given distribution
sampleX <- ars(f = f, n = 1e4, showg = TRUE, upperB = Inf, lowerB = -Inf)
```