Exact Simulation

Overview

We use Monte Carlo integration on random variables that do not follow a familiar parametric distribution. However, When the target distribution comes from a standard parametric family, abundant software can help us generate random deviates from the distributions.

Example

Consider the model given by $X \sim lognormal(0,1)$ and $logY = 9+3logX+e$, where $e \sim N(0,1)$ is independent of X. Use simulation to estimate $E[Y/X]$.
Since $logY = 9+3logX+e$, $Y = exp\{9+3logX+e\}$

```
set.seed(1693)
n<-10^6
x<-rlnorm(n,0,1)
e<-rnorm(n,0,1)
y<-exp(9+3*log(x)+e)
mean(y/x)
```

```
## [1] 99184.74
```