Contact information:
Thijs van den Berg
Managing Director - SITMO

web: www.sitmo.com
email: thijs@sitmo.com
phone: +31 6 24110061

Click here to check for updates of this document **http://sitmo.com/eq/170.pdf**

Probability of the low of geometric Brownian motion

created by **Thijs van den Berg**

$$P\left(\min_{0<t<T} S_t \leq L\right) = \tfrac{1}{2}\mathrm{Erfc}(d_1) + \tfrac{1}{2}\left(\tfrac{L}{S_0}\right)^{\frac{2\mu}{\sigma^2}-1}\mathrm{Erfc}(d_2)$$

$$d_1 = \frac{\ln\frac{S_0}{L} + (\mu - \frac{1}{2}\sigma^2)t}{\sigma\sqrt{2t}}$$

$$d_2 = \frac{\ln\frac{S_0}{L} - (\mu - \frac{1}{2}\sigma^2)t}{\sigma\sqrt{2t}}$$

$$\mathrm{Erfc}(x) = \frac{2}{\sqrt{\pi}}\int_x^\infty e^{-t^2}dt$$

Cumulative probability function of the high of an underlying between now and some future time t. The underlying behavior is geometric Brownian motion.

Symbol list:

$P(x)$	Probability of x
L	Low level
S_0	Initial value at t=0 of the Brownian moton
μ	Drift term
σ	Volatility