Contact information:
Thijs van den Berg
Managing Director - SITMO

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

Geometric average in time, discretely sampled

created by **Thijs van den Berg**

$$Y_{ave} = (Y - \tfrac{1}{2}\sigma^2)\frac{t_1 + t_n}{2}$$
$$\sigma_{ave} = \sigma\sqrt{\frac{t_1(4n+1) + t_n(2n-1)}{t_n 6n}}$$

The geometric average in time of geometric Brownian motion is lognormal distributed.

These equations express the two parameters of the lognormal distribution as a function of the discretely sampled geometric average. The first averaging point is "t1", the last "tn", and the total number of averaging points is "n".

An application is the Vorst model for Asian options. In this model the arithmetic average of the Asian options is approximated with a geometric average.

Symbol list:

Y	yield of the udnerlying
Y_{ave}	Effective yield of the average of the underlying
σ	Volatility of the underlying
σ_{ave}	Effective volatility of the average of the underlying
n	Number of arveraging points
t_1	Time of the first average
t_n	Time of the last average