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Expected value of a geometric Brownian motion raised to a power for S>K

created by **Thijs van den Berg**

$$E[S_T^p|S_T > K] = S_T^p \exp\left(p(Y + (p-1)\frac{1}{2}\sigma^2)T\right) N(d_p)$$

$$d_p = \frac{\ln(S_T/K) + (Y - (p - \frac{1}{2})\sigma^2)T}{\sigma\sqrt{T}}$$

This equation calculates the expected value of a geometric Brownian motion raised to the power of p of the part of the geometric Brownian motion that is above K at time T. This equation is used in "Pricing and Hedging Power Options" by Ronald C. Heynen and Harry M. Kat.

Symbol list:

$E[A$	B] The expectation of A under the condition of B
S_T	The value of an asset at time T
S_T^p	The value of an asset at time T raised to the power of p
K	Strike
Y	Yield of the asset. For stocks Y=interest rate, for futures Y=0
σ	Volatility of the asset
$N(.)$	Cumulative normal distribution function