	Call	Put	Binary Call	Binary Put
Value V Black–Scholes value	$Se^{-D(T-t)}N(d_1)$ $-Ee^{-r(T-t)}N(d_2)$	$-Se^{-D(T-t)}N(-d_1)$ $+Ee^{-r(T-t)}N(-d_2)$	$e^{-r(T-t)}N(d_2)$	$e^{-r(T-t)}(1-N(d_2))$
Delta $\frac{\partial V}{\partial S}$ Sensitivity to underlying	$e^{-D(T-t)}N(d_1)$	$e^{-D(T-t)}(N(d_1)-1)$	$\frac{e^{-r(T-t)}N'(d_2)}{\sigma S\sqrt{T-t}}$	$-\frac{e^{-r(T-t)}N'(d_2)}{\sigma S\sqrt{T-t}}$
Gamma $\frac{\partial^2 V}{\partial S^2}$ Sensitivity of delta to underlying	$\frac{e^{-D(T-t)}N'(d_1)}{\sigma S\sqrt{T-t}}$	$\frac{e^{-D(T-t)}N'(d_1)}{\sigma S\sqrt{T-t}}$	$-\frac{e^{-r(T-t)}d_1N'(d_2)}{\sigma^2S^2(T-t)}$	$\frac{e^{-r(T-t)}d_1N'(d_2)}{\sigma^2S^2(T-t)}$
Theta $\frac{\partial V}{\partial t}$ Sensitivity to time	$-\frac{\sigma Se^{-D(T-t)}N'(d_1)}{2\sqrt{T-t}}$ $+DSN(d_1)e^{-D(T-t)}$ $-rEe^{-r(T-t)}N(d_2)$	$-\frac{\sigma Se^{-D(T-t)}N'(-d_1)}{2\sqrt{T-t}}$ $-DSN(-d_1)e^{-D(T-t)}$ $+rEe^{-r(T-t)}N(-d_2)$	$re^{-r(T-t)}N(d_2)$ $+e^{-r(T-t)}N'(d_2)$ $\times\left(\frac{d_1}{2(T-t)}-\frac{r-D}{\sigma\sqrt{T-t}}\right)$	$re^{-r(T-t)}(1-N(d_2))$ $-e^{-r(T-t)}N'(d_2)$ $\times\left(\frac{d_1}{2(T-t)}-\frac{r-D}{\sigma\sqrt{T-t}}\right)$
Speed $\frac{\partial^3 V}{\partial S^3}$ Sensitivity of gamma to underlying	$-\frac{e^{-D(T-t)}N'(d_1)}{\sigma^2S^2(T-t)}$ $\times(d_1+\sigma\sqrt{T-t})$	$-\frac{e^{-D(T-t)}N'(d_1)}{\sigma^2S^2(T-t)}$ $\times(d_1+\sigma\sqrt{T-t})$	$-\frac{e^{-r(T-t)}N'(d_2)}{\sigma^2S^3(T-t)}$ $\times\left(-2d_1+\frac{1-d_1d_2}{\sigma\sqrt{T-t}}\right)$	$\frac{e^{-r(T-t)}N'(d_2)}{\sigma^2S^3(T-t)}$ $\times\left(-2d_1+\frac{1-d_1d_2}{\sigma\sqrt{T-t}}\right)$
Vega $\frac{\partial V}{\partial \sigma}$ Sensitivity to volatility	$S\sqrt{T-t}e^{-D(T-t)}N'(d_1)$	$S\sqrt{T-t}e^{-D(T-t)}N'(d_1)$	$-e^{-r(T-t)}N'(d_2)$ $\times\left(\sqrt{T-t}+\frac{d_2}{\sigma}\right)$	$e^{-r(T-t)}N'(d_2)$ $\times\left(\sqrt{T-t}+\frac{d_2}{\sigma}\right)$
Rho (r) $\frac{\partial V}{\partial r}$ Sensitivity to interest rate	$E(T-t)e^{-r(T-t)}N(d_2)$	$-E(T-t)e^{-r(T-t)}N(-d_2)$	$-(T-t)e^{-r(T-t)}N(d_2)$ $+\frac{\sqrt{T-t}}{\sigma}e^{-r(T-t)}N'(d_2)$	$-(T-t)e^{-r(T-t)}(1-N(d_2))$ $-\frac{\sqrt{T-t}}{\sigma}e^{-r(T-t)}N'(d_2)$
Rho (D) $\frac{\partial V}{\partial D}$ Sensitivity to dividend yield	$-(T-t)Se^{-D(T-t)}N(d_1)$	$(T-t)Se^{-D(T-t)}N(-d_1)$	$-\frac{\sqrt{T-t}}{\sigma}e^{-r(T-t)}N'(d_2)$	$\frac{\sqrt{T-t}}{\sigma}e^{-r(T-t)}N'(d_2)$

$$d_1=\frac{\log\left(\frac{S}{E}\right)+(r-D+\frac{1}{2}\sigma^2)(T-t)}{\sigma\sqrt{T-t}},\quad d_2=\frac{\log\left(\frac{S}{E}\right)+(r-D-\frac{1}{2}\sigma^2)(T-t)}{\sigma\sqrt{T-t}}=d_1-\sigma\sqrt{T-t},\quad N(x)=\frac{1}{\sqrt{2\pi}}\int_{-\infty}^{x}e^{-\frac{1}{2}\xi^2}\,d\xi \quad \text{and} \quad N'(x)=\frac{1}{\sqrt{2\pi}}e^{-\frac{1}{2}x^2}$$