$\because \quad C = e^{-rT}\int_d^{\infty}(S_0e^{rT}+\sigma\sqrt{T}x-K)\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}dx.$

$$= e^{-rT}\Big[\underbrace{S_0e^{rT}\int_d^{\infty}\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}\cdot dx}_{①} + \underbrace{\int_d^{\infty}(\sigma\sqrt{T}\cdot x)\cdot\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}dx}_{②} - \underbrace{K\int_d^{\infty}\frac{1}{\sqrt{2\pi}}e^{-\frac{x^2}{2}}dx}_{③}\Big]$$

For the part ②

$$\int_d^{\infty}(\sigma\sqrt{T}\cdot x\cdot\frac{1}{\sqrt{2\pi}})e^{-\frac{x^2}{2}}dx$$

$$= \sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\int_d^{\infty}x\cdot e^{-\frac{x^2}{2}}dx.$$

$$= \sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\int_d^{\infty}-e^{u}du.\quad\text{, where } u=-\frac{x^2}{2}.$$

$$= -\sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\int_d e^{u}du.$$

$$= -\sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\left[e^{u}\right]_{-\frac{d^2}{2}}^{-\infty}$$

$$= -\sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}(e^{-\infty}-e^{-\frac{d^2}{2}}).$$

∵ $e^{-\infty} \approx 0$.

∴ $-\sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\left(e^{-\infty}-e^{-\frac{d^2}{2}}\right)$

$= \sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\cdot e^{-\frac{d^2}{2}}$

∵ $N(-z) = 1 - N(z) = \frac{1}{\sqrt{2\pi}}\int_{z}^{\infty} e^{-\frac{x^2}{2}}\,dx$

∴ $C = e^{-rT}\left[S_0e^{rT}\cdot N(-d) + \left[-\sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}\left(e^{-\infty}-e^{-\frac{d^2}{2}}\right) - k\cdot N(-d)\right]\right]$

$= e^{-rT}\left[\left(S_0e^{rT}-k\right)\cdot N(-d) + \sigma\sqrt{T}\cdot\frac{1}{\sqrt{2\pi}}e^{-\frac{d^2}{2}}\right]$.