2022/10/20

$$LGS(x) = L + \frac{K-L}{1+\frac{1}{\theta}\exp\left(-r\frac{(x-d)}{\theta}\right)^{\theta}} \quad (1)$$

$$= L + \frac{K-L}{1+\frac{1}{\theta}\exp(-r(x-d))} \quad (2)$$

$$\frac{d}{dx}LGS(x) = 0 + \frac{(K-L)\times(-1)}{\left(1+\frac{1}{\theta}\exp(-r(x-d))\right)^2}\frac{d}{dx}\left(1+\frac{1}{\theta}\exp(-r(x-d))\right)$$

$$= -\frac{(K-L)}{\left(1+\frac{1}{\theta}\exp(-r(x-d))\right)^2}\left(0+\frac{1}{\theta}\frac{d}{dx}\exp(-r(x-d))\right)$$

$$= \text{"} \left(\frac{1}{\theta}\exp(-r(x-d))\frac{d}{dx}(-r(x-d))\right)$$

$$= \text{"} \text{"} (-r)$$

$$= -\frac{K-L}{\left(1+\frac{1}{\theta}\exp(-r(x-d))\right)^2}\left(\frac{1}{\theta}\exp(-r(x-d))\right)(-r)$$

Evaluated at $x = d$

$$\left.\frac{d}{dx}LGS(x)\right|_{x=d} = -\frac{K-L}{\left(1+\frac{1}{\theta}\exp(0)\right)^2}\frac{1}{\theta}\exp(0)(-r)$$

$$= \frac{K-L}{\left(1+\frac{1}{\theta}\right)^2}\frac{r}{\theta} \quad (3)$$