$$\left[V_{BS}\underset{d_1, d_2}{(\sigma)} - 5.57 = 0 \right]$$

(1) $$V(\sigma_{i+1}) = V(\sigma_i) + V'(\sigma_i)(\sigma_{i+1} - \sigma_i)$$

$$\frac{V(\sigma_{i+1}) - V(\sigma_i)}{\sigma_{i+1} - \sigma_i} = +V'(\sigma_i)$$

(2) $$\sigma_{i+1} = \sigma_i - \frac{V(\sigma_i)}{V'(\sigma_i)}$$

where this is Vega $\frac{\partial V}{\partial \sigma}$

$\sigma_0 = 20\%$

$\sigma_1 = 20.5\%$

$\sigma_{i+1} = \ldots$

$$P\&L = dV^i - dV^a - r(V^i - V^a)dt$$

$$= dV^i - rV^i dt - (dV^a - rV^a dt)$$

$$\left[e^{rt} e^{-rt} (dV - rV dt) \right]$$

$$e^{rt} \left[e^{-rt} dV - e^{-rt} rV dt \right]$$

$$e^{rt} \; d\left(e^{-rt} V\right)$$ by Product Rule

derivative of $PV = e^{-rt} V$