QF602 - Homework 5

Question

- Assume the spot prices follows a lognormal process with risk free rate r, dividend yield q and volatility σ:

$$\frac{dS_t}{S_t} = (r - q)dt + \sigma dW_t$$

under the risk neutral measure. Derive the formula for up-and-in put option which has the payoff at maturity T:

$$(K - S_T)^+ 1_{M_T^S \geq H}$$

where K is the strike and $H > S_0$ is the upper barrier. M_T^S is the maximum of S_t between $[0, T]$.

You need to show all the steps clearly to get full marks.