M3/4/5A22 ASSESSED COURSEWORK, 18.11.2016

Deadline 4pm, 2.12.2016

With payoff h, initial stock price S_0, final price $S := S_T$, interest rate r and volatility σ, price:

(a) the claim with $h(S) = (aS + 1)^2$, with $a > 0$;

(b) the call option on this claim with strike price K, that is with payoff $h(S) = [(aS + 1)^2 - K]_+$, with $a > 0$.

(c) British bank Barclays seems to have recovered well from its Brexit shock, and is trading at $S_0 = 210.85$p as of 17th November 2016. You're not convinced this rise will continue, however, and so decide to sell a call option with an expiry of $T = 1$ year (let this be unit time), with a strike price $K = S_0$ and payoff as in (b) with $a = 0.075$. You've estimated the volatility of this share over one year to be $\sigma = 0.25$. What is the price of this option?

EDIT (28/11/2016): Use interest rate $r = 0$, OR state your interest rate clearly.

NHB

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