13/01/2011

1)

a) (1 point) Suppose an investor has a forward currency exchange contract, which states that he shall sell 100 000 GBP in exchange for dollars at a rate of 1.9$/GBP. At maturity, the exchange rate is at 1.89. What is the gani/loss for the investor (answer: 1000 gain)

b) (1 point) What is the current level of the BEL 20, and how has it performed over 2011 (answer: about 2000 now, has been at 2700 beginning of 2011, dropped mostly in summer)

c) (1 point) What is the rate on 10year bunds, and what is the rate on belgian 10y bonds (answer: I think it was about 1.5% vs. 4% at first Jan 2012, but I think spread has widened again since then)

d) (1 point) Bank quotes a 10% rate on a product, paid quarterly, what is the continuously compounded r which corresponds to it? (answer = (ln(1+2.5%))^4)

2)

a) (2 points) Give pay off of long one call option at K=100K and short one call option at K=110 (answer: 0 for S<100, 10 for S>110, linear between)

b) (2 points) Give 6 factors that determine price of american put on dividend paying stock and if the parameter goes up, what does price of AP do (vol +, T +, K +, S -, r -, q +; I'm not sure about +/- everywhere, but think most of them are correct)

3) (4 points)

Prove that exercising an American Call is never optimal, using non arbitrage argument

4)

a) (2 points) calculate value of given down and out call option (sigma given, r given) using 2 period tree

b) (1 point) give BS formula for European Call

c) (2 points) if vol per annum is 30%, what is vol at one trading day (answer = 30%/sqrt(260), assuming 260 trading days) and what is daily variance of percentage return on stock (answer: this is exactly the same thing)

d) (3 points) given the BS SDE dX = mu dt + sigma dW, derive the BS PDE, using a portfolio hedging argument (no idea how to do this :-))

January 2014

1)Proof put call parity. Can the same relationship be used for American calls.

2)What is the delta for an ATM Call with volatility between .2 and .3 with 1 year maturity?

<.35

Between .35 and .65

Between .65 and 1

>1

If there is a VIX of 16, what is the daily devation of a stock?

1%

2%

3%

4%

If you would exchange 100 USD in euro how much would you get in today's prices?

<80

Between 80 and 125

Between 125 and 140

>140

If K=S0exp{rT}, is the euro put equal to the euro call with same maturity?

True/False

3) discuss pricing of 2-step trinomial American Put

4)explain relationship between Itô's lemma, Feyman-Kac and Black&Scholes

Exam Janury 24, 2018 (9 AM)

The exam was closed-book. You got 3 hours to complete the question, for which it was important to write your answers down clearly. After that (or sooner if you are ready), there is a short oral part where the professor read your answers to see if he understand them and if you did not make any stupid mistakes. Before the exam, the professor gave some extra information about the questions: this is written between (). The points were distributed equally over the four questions.

Q1. Consider a non-divende paying stock. Proof that if interest rates are zero (r = 0), that the put-call parity for European vanillas is also valid for American vanillas. (Give + proof the put-call parity. Proof the validity for American vanillas.)

Q2. Discuss the pricing of an American put option in detail in a 3-step binomial tree model. (Do this step by step. Use formulas. Every detail is important.)

Q3. What is a complete model? Give briefly a definition/explanation of the concept. How can you check whether a model is complete or not? Provide an example of a model which is not complete and relate this to your statements. (Why relevant? What does it actually mean?)

Q4. Derive the Black-Scholes partial differential equations for the price O for options: $\frac{\partial O}{\partial t} + \frac{1}{2} \sigma^2 S^2 \frac{\partial^2 O}{\partial S^2} + r S \frac{\partial O}{\partial S} - r O = 0$. (Proof that this is true, using a lemma. Your answer should be a mixture of correct mathematical formulas and sentences.)

Examen vrijdag 9 januari 2015 om 14.00 uur

Waarom hebben put en call gelijke prijs als K= S0*e^rT

Waar of niet waar?

Uitdrukking van EC(T,K)=... Met delta, gamma en nog een andere greek erin.

De prijs van een ODBC is altijd hoger dan IDBC als H<K<=S0

de integraal van Ws dWs = Ws/2

Wat is het verschil tussen real world en riskneutral world? Wat betekent dit voor het binomial tree model en het black scholes model?

Geef de black scholes SDE en leg uit wat deze voorstelt, geef de oplossing