TD4 Financial market

Exercice 1. Give the payoff and draw this one for the following strategies :

1. Strip : you buy a call and two put with the same strike K and the same maturity T.
2. Bull spread : you buy a call with strike K_1 and you sell a call with strike K_2 with $K_1 < K_2$ with the same maturity T.
3. Butterfly : you buy a call with strike $K + \delta$ and a call with strike $K - \delta$ and you sell two call with strike K.

Exercice 2. We assume that there is no arbitrage on the market. We denote B_0 the price on 0 of the riskless asset which gives 1 on T. We denote C_0 and P_0 the price on 0 of a call and a put on an underlying S whose the maturity is T and the strike is K.

1. Prove by arbitrage that

$$(S_0 - KB_0)^+ \leq \quad C_0 \quad \leq S_0 \, .$$

2. Deduce

$$(KB_0 - S_0)^+ \leq \quad P_0 \quad \leq KB_0 \, .$$

Exercice 3. We consider a market with two dates 0 and 1, composed by a riskless asset S^0 with interest rate equals to 25% and a risky asset whose the initial value is 1\$ and the value on 1 can be 0.5\$ or 1\$ or 1.5\$ or 2\$ with the same probability. We can also buy a call of strike 1 for the price 0.2\$. The market is viable ?

Exercice 4. The price of gold is currently \$500 per ounce. The forward price for delivery in one year is 700\$. An arbitrageur can borrow money at 10% per annum. What should the arbitrageur do ? Assume that the cost of storing gold is zero and that golds provides no income.

Exercice 5. A European call option and put option on a stock both have a strike price of \$20 and an expiration date in three months. Both sell for \$3. The risk-free interest rate is 10% p.a., the current stock price is \$19. Identify the arbitrage opportunity open to a trader.