Financial Mathematics – Exam 2018/2019

1. An investor wishes to accumulate 200 PLN. How many months must the investor pay 40 PLN at the beginning of each month if the interest rate is 12% per annum, compounding annually. Solve the problem of non-integer value of the term of annuities. Rework example with deposits at the end of each month.

(1.5 points)

2. An investor borrowed 2000 PLN. The loan was for 6 months at 24% annual interest (compound interest rate). Create a loan amortization schedule if

a) since the fourth month the annual interest is 18%,

b) the investor doesn't pay the fourth payment but he pays it plus interest with the fifth payment,

c) the first payment is postponed for two months,

d) the investor pays two payments, than he doesn't pay for 3 months. The investor begins to pay off the loan again in the sixth month paying three equal payments every two months. Since the third month the annual interest rate is 18%.

(2 points)

3. Create a four-period binominal price tree and find the fair value of an European call and put options and an American put option on a nondividend-paying stock if the initial stock price is 82 PLN, the strike price of 80 PLN is expiring at the end of the fourth month, the compound risk-free interest rate is 12% per annum, and $\sigma = 0.1$.

(1.5 points)

4. Find the fair value of an European call option and an American put option using the incoherent and coherent binomial option tree if the underlying asset pays dividend of 4 PLN in one and half month. The initial stock price is 60 PLN, the strike price of 58 PLN is expiring at the end of the third month, the continuously compounded risk-free interest rate is 10% per annum, and the stock volatility is 20%.

(1.5 points)

5. Suggest two different option strategies if

a) the price of the underlying asset is expected to increase,

b) the price of the underlying asset is expected to decrease.

(1 point)