



Student Name	
Student ID #	

Question #1

Consider an option on a non-dividend-paying stock when the stock price is €50, the exercise price is €56, the risk-free interest rate is 3%, the volatility is 35% per annum, and the time to maturity is 18 months.

- What is the price of the option if it is a European put?
- What is the price of a European put? describe the put-call parity condition and represent an example of arbitrage opportunity.
- Assume now that the stock is expected to pay a dividend of €2 in 4 months and in 16 months. What is the price of the option if it is an American call?
- Do you think that it might be optimal to exercise the option described in b. on the dividend date?

Question #2

Calculate the price of an option that caps the six-month rate, starting in 12-month time, at 5% (quoted with 6-month compounding) on a principal amount of €1 million. The current 12-month rate and 18-month rate are respectively 3% and 3.5% (both rates are with continuous compounding), and the volatility of the forward rate is 15% per annum.

Question #3

Suppose that a portfolio is worth €10 million and the index level is at 20,000. Suppose also that the portfolio beta is 1.5, the risk-free interest rate is 4% per annum, and the dividend yield on both the portfolio and the index is 2% per annum. Assume that each option contract is worth 100 times the index.

- What options should be purchased to provide protection such that the maximum loss on the portfolio would be equal to 10% in one year's time?
- Show that the protection is effective when the value of the portfolio falls by 20% in one year's time.

Question #4

Consider a European swap option that gives the holder the right to enter into a 2-year annual-pay swap in 1 year where a fixed rate is 2% is paid and LIBOR is received. The swap principal is EUR 100 million. Assume that the yield curve is flat at 2% per annum with continuous compounding and the volatility of the swap rate is 20%.

- What is the value of the swaption?

Assume now that the yield curve is the following (rates are with continuous compounding): 1% at 1 year horizon, 2% at 2 years horizon, 3% at 3 years horizon, 4% at 4 years horizon.

- What is the forward swap rate?
- What is the value of the swaption?