BUSS386 Problem Set 6

Introduction to Options

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Problem 1 — Terminology check

Answer in one sentence each.

(a) In one sentence, what is the fundamental asymmetry between a forward contract and an option contract?

(b) Define *intrinsic value* and *time value* of an option. Which one is always non-negative? Which one can be zero at expiry?

(c) A trader writes (sells) a put option. Is she long or short volatility, and why?

(d) In an option chain, what is the difference between *volume* and *open interest*?

(e) Why does a higher dividend yield *lower* a call's value but *raise* a put's value?

Problem 2 — Payoff and profit for the four basic positions

A 3-month European option on a non-dividend-paying stock has strike $K = \$100$. The call premium is $c = \$6$ and the put premium is $p = \$4$. Ignore time value of money.

(a) Complete the following table of payoffs and profits per share for each of the four basic positions at expiry, for $S_T \in \{80, 95, 100, 110, 120\}$:

	Long call		Short call		Long put		Short put	
S_T	payoff	profit	payoff	profit	payoff	profit	payoff	profit
80								
95								
100								
110								
120								

(b) Compute the *breakeven* stock price at expiry for the long call and the long put.

(c) Which has the larger maximum possible loss — a short call or a short put? Justify in one sentence.

Problem 3 — KOSPI 200 option example

A Korean investor buys 5 KOSPI 200 June 2026 *call* option contracts with strike $K = 365$, premium $c = 4.20$ index points. Contract multiplier = ₩ 250,000 per index point. Today's spot index level is 360.

(a) What is the moneyness of this option today (ITM/ATM/OTM)?

(b) What is the option's intrinsic value today? Its time value?

(c) Total ₩ premium paid today for all 5 contracts.

(d) Compute the total ₩ profit or loss at expiry for each of the following index levels: $S_T \in \{350, 365, 369.20, 380, 400\}$.

(e) At which S_T is the position's profit exactly zero?

(f) By how much (in percent) does the spot index need to rise from 360 to reach the breakeven? Compare this to a direct stock-index investment.

Problem 4 — Insurance with a long put

You own 200 shares of MSFT at \$500 per share (current portfolio value \$100,000). You are worried about a 3-month drawdown. A 3-month European put on MSFT with $K = \$475$ trades at \$8 per share. (Each US listed equity option covers 100 shares.)

(a) How many put contracts do you need to fully hedge the 200 shares? What is the total premium cost?

(b) Compute your total portfolio value (stock + puts) at expiry for $S_T \in \{400, 450, 475, 500, 550\}$. Ignore TVM.

(c) What is the *worst-case* value of the hedged portfolio between today and expiry?

(d) In one sentence, compare the put-hedge to (i) selling the stock outright today and (ii) selling MSFT futures.