Name: _____

Student ID: _____

Derivative Products: 2° Term Exam

LAT4012

Academic Integrity Statement

"I certify that I am completing this exam individually and without the use of unauthorized resources. I commit to upholding academic integrity standards and confirm that I have neither received nor provided inappropriate assistance during this exam."

Signature: _____

Q1. Basics

a) Define a **derivative** and list **three** common types of underlyings
b) Compare **OTC vs. exchange-listed** in two points.
c) Distinguish **hedger**, **speculator**, and **arbitrageur** in one sentence each.

Q2. Forwards: multi-case valuation

Data: $S_0 = 95$. Horizon $T = 9\ months$. (Assume 1 year means T = 1)
Compute $F_{0,T}$ for:

i) **No dividends**, $r = 6\%$(continuous compounding)
ii) **Continuous dividends**, $r = 6\%$(cont. comp.), $d = 2\%$
iii) **FX forward** USD/MXN: $x_0 = 18.20$, $r_{MXN} = 10\%$ (cont.), $r_{USD} = 4\%$(cont.), $T = 0.5$.
iv) If in (i) the market forward is $F^{mkt} = 100.6$, is there an **arbitrage**? Describe the trade.

Q3. Forwards: payoff and profit

Long forward with $K = 100$; maturity in 6 months. Compute **payoff and profit** for **long** and **short** when $S_T \in \{90,100,115\}$. Present in a table.

Q4. Put–call parity

Non-dividend-paying stock: $S_0 = 40$. **European call:** $K = 45, T = 0.75$ years, premium $C_0 = 2.84$. **Rate** $r = 5\%$(cont.).
a) Use **put–call parity** to **compute** P_0.
b) If the put trades at 6.80, is parity **violated**? What **arbitrage** would you implement?

Q5. Option strategies

a) **Bull call spread**: Buy $C(K_1 = 50)$at 6.20, sell $C(K_2 = 60)$at 2.30.

- Draw the **payoff at maturity** and report **max gain, max loss, and breakeven**.

b) **Bear put spread (debit spread)**: Let $S_0 = 55$. Buy **put** $K_H = 60$at **4.50** and sell **put** $K_L = 50$at **1.80** (same maturity).

- i) **Net cost** today.
- ii) **Max gain**, **max loss**, and **breakeven**.
- iii) Describe the **payoff shape** at maturity.

c) Explain the difference between a **cap** and a **floor** is preferable (one line each). (6 pts)

d) Explain when a **covered call (written call)** vs. a **protective put (written put)** is preferable.

Q6. Synthetics & Parity

a) Show how to **replicate a stock or a bond** with options and cash using **put–call parity** (state the identity and explain each term).
b) **Parity check/no-arbitrage:** $S_0 = 52, K = 50, T = 1$year, $r = 4\%$(cont.), $C_0 = 9, P_0 = 7$.

- Does parity hold? If **not**, design an **arbitrage** (what to buy/sell **today** and how it closes at T).