UNIVERSITY OF TEXAS AT AUSTIN

Quiz #19

Box spreads. Ratio spreads.

Provide your **complete solution** to the following problems. Final answers only, without appropriate justification, will receive zero points even if correct. A graphical solution is not only sufficient but welcomed!

Problem 19.1. (2 points) A **box** spread is a replicating portfolio for a bond. *True or false? Why?*

Solution: TRUE

Problem 19.2. (2 points) The payoff function of a ratio spread is never bounded from above. *True or false? Why?*

Solution: FALSE

Problem 19.3. (2 points)

The following is a replicating portfolio for a *ratio spread*:

Long a two-year European call and write a three-year European call with the same strike price and the same underlying asset.

True or false? Why?

Solution: FALSE

Problem 19.4. (2 points)

You long a $(90, 100, 110)-$butterfly spread with one long \$90-strike call. Then, you short one \$110-strike European call with the same exercise date and underlying asset. The portfolio you end up with is equivalent to a ratio spread. *True or false? Why?*

Solution: TRUE

Problem 19.5. (2 points) An investor wants to speculate on **low** volatility combined with a higher likelihood of lower than higher prices. Then, he should long a ratio spread with fewer calls of the lower strike.

True or false? Why?

Solution: TRUE

Problem 19.6. (5 points)

Consider a continuous-dividend-paying stock whose current price is \$50 and whose dividend yield is 0.01. The continuously compounded, risk-free interest rate is 0.05.

Consider a portfolio consisting of:

(1) a $(45, 60)$ call bull spread, and
(2) a $(45, 60)$ put bear spread.

All the options are European with exercise date in one year. What is the price of the above portfolio?

Solution: This is a box spread. So, the price is $(60 - 15)e^{-0.05} = 14.2684$.

Alternatively, using put-call parity, we have that the portfolio's price is

$$V_C(45) - V_C(60) - V_P(45) + V_P(60) = (V_C(45) - V_P(45)) - (V_C(60) - V_P(60))$$
$$= F_{0,1}(S) - 45e^{-r} - (F_{0,1}(S) - 60e^{-r}) = 15e^{-0.05} = 14.2684.$$