UNIVERSITY OF TEXAS AT AUSTIN

# HW Assignment 2

Forward contracts. European calls options.

**Problem 2.1.** (2 points) Derivative securities can reduce the risk of both the buyer and the writer of the security. *True or false?*

**Problem 2.2.** (2 points) An agent is **only** allowed to long a forward contract if he/she is willing to take physical delivery of the underlying asset. *True or false?*

**Problem 2.3.** (2 points) A short forward contract has an unlimites loss potential. *True or false?*

**Problem 2.4.** (5 points) The current price of stock a certain type of stock is \$80. The premium for a $6-$month, at-the-money call option is \$5.84. Let the continuously compounded, risk-free interest rate be 0.04. What is the break-even point of this call option?
    (a) \$80
    (b) \$85.72
    (c) \$85.84
    (d) \$85.96
    (e) None of the above.

**Problem 2.5.** (5 points) The price of gold in half a year is modeled to be equally likely to equal any of the following prices

$$\$1000, \quad \$1100, \quad \text{and} \quad \$1240.$$

Consider a half-year, \$1050-strike European call option on gold. What is the expected payoff of this option according to the above model?

**Problem 2.6.** (2 points) A cap is a long position with respect to the underlying asset. *True or false?*

**Problem 2.7.** (2 points) In our usual notation, the payoff of a **cap** is $\min(S(T), K)$ with the underlying asset not paying any dividends. *True or false?*

**Problem 2.8.** (5 points) The "Very tasty goat cheese Co" sells artisan goat cheese at \$10 per oz. They need to buy 200 gallons of goat milk in six months to make 200 oz of their specialty fall-equinox cheese. Non-goat milk aggregate costs total \$500. They decide to buy six-month, \$5-strike call options on gallons of goat milk for 0.50 per call option.
    The continuously compounded, risk-free interest rate equals 0.04.
    In six months, the price of goat milk equals \$6 per gallon. What is the profit of the company's hedged position?
    (a) 395.92
    (b) 397.98
    (c) 400
    (d) 897.98
    (e) None of the above.

**Problem 2.9.** (2 points) An agent is **only** allowed to write options on an underlying asset if he/she already owns units of the underlying. *True or false?*

**Problem 2.10.** (2 points) A covered call is a portfolio consisting of a written call option and the short underlying. *True or false?*

**Problem 2.11.** (5 points) Today's price of a non-dividend-paying stock is $1000 and the annual effective interest rate is given to be 5%. You write a one-year, $1,050-strike Eureopan call option for a premium of $10 while you simulataneously buy the stock. What is your **profit** if the stock's spot price in one year equals $1,200?

**Problem 2.12.** (6 points) For what values of the final asset price is the profit of a long forward contract with the forward price $F = 100$ and delivery date $T$ in one year smaller than the profit of a long call on the same underlying asset with the strike price $K = 100$ and the exercise date $T$. Assume that the call's premium equals $10 and that the annual effective interest rate equals 10%.

Express your asnwer as an interval.

**Problem 2.13.** (10 points) *Source: Sample FM(DM), Problem#11*
The current stock price is $40, and the effective annual interest rate is 8%.

You observe the following option prices:
(1) The premium for a $35-strike, 1-year European call option is $9.12.
(2) The premium for a $40-strike, 1-year European call option is $6.22.
(3) The premium for a $45-strike, 1-year European call option is $4.08.

Assuming that all call positions being compared are **long**, at what 1-year stock price range does the $45-strike call produce a higher profit than the $40-strike call, but a lower profit than the $35-strike call?

Express your answer as an interval.