UNIVERSITY OF TEXAS AT AUSTIN

HW Assignment 4

Probability. Forward contracts.

Please, provide your complete solutions to the following problems. Final answers only, without the justification, will earn zero points.

Problem 4.1. (10 points) Complete the following definition:
The two random variables X and Y are said to be **equal** if:

Problem 4.2. (10 points) Complete the following definition:
The two random variables X and Y are said to be **identically distributed** if:

Problem 4.3. (10 points) Provide an example of a pair of random variables which are identically distributed, but **not** equal.

Problem 4.4. (2 points) Derivative securities can only be used for hedging, i.e., they can only be bought and written by agents who already have a position in the underlying asset. *True or false?*

Problem 4.5. (2 points) The profit diagram and the payoff diagram for long positions in a forward contract are identical. *True or false? Why?*

Problem 4.6. (2 points) In our usual notation, the difference between the **profit** of a long forward contract and a long investment in one unit of the non-dividend-paying underlying asset equals the forward price. *True or false?*

Problem 4.7. (4 points) We all enter derivative-security-like contracts on a daily basis. For instance, ordering a pizza can be understood as a forward contract on the pizza. Ignore time-limits on when the pizza should be delivered. Imagine that the pizza is to be delivered in 30 minutes **exactly**. Explain why the pizza ordering is similar to a forward contract.

Problem 4.8. (5 points) Maryam bakes batches of cupcakes for a cupcake convention. She buys forward 21 pounds of raspberries from a local farmer at the forward price of \$5.60 per pound.

She projects to bake 336 cupcakes and sell each for \$3. The total and aggregate non-raspberry costs of baking the cupcakes are \$200.

If the market price of raspberries on the day of the cupcake convention is \$5.40, what is Maryam's profit?

Problem 4.9. (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?