University of Texas at Austin

Problem Set #3

Forward contracts. European call options. European put options.

3.1. Forwards.

Problem 3.1. (5 points) A soy-bean farmer shorts forward contracts on soy in an amount matching his crop volume and with delivery at harvest time. Then, he is considered:

- $\mathbf{\chi}$ (a) an arbitrageur.
- **x** (b) a broker.
- **x** (c) a speculator.
 - (d) a hedger.
 - (e) None of the above.

3.2. Calls.

Problem 3.2. The initial price of a non-dividend-paying asset is \$100. A six-month, \$95-strike European call option is available at a \$8 premium.

The continuously compounded risk-free interest rate equals 0.04.

What is the break-even point for this call option?

$$(b)$$
 8'

$$\frac{(5-95)_{+}}{5^{2}} - 8.e^{0.04(0.5)} = 0$$

$$5^{2}=95 + 8e^{0.02}$$

$$= 103.16$$

Problem 3.3. (5 points) A stock's price today is \$1000 and the annual effective interest rate is given to be 5% You write a one-year, \$1,050 strike 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?

(e) None of the above.

Problem 3.4. (20 points)

The primary ingredient for a certain jeweler is gold which she intends to buy in exactly one year. She considers all of her other production-related expenses to be negligible.

The jeweler uses exactly one ounce of gold to produce every one of her pieces, and will able to sell every piece for \$1,000.

The jeweler models the market price of gold in one year as follows:

	Gold price in one year	Probability	7				
-	750 per ounce	0.2		Ļ	dist'n	of	S(T)
	850 per ounce	0.5	1				
	950 per ounce	0.3					

The jeweler hedges the price of gold by buying a 1-year call option with an exercise price of \$900 per ounce. The option costs \$100 per ounce now.

The continuously compounded risk-free interest rate is 5%

Calculate the expected profit of the **hedged** portfolio per piece of jewelery produced.

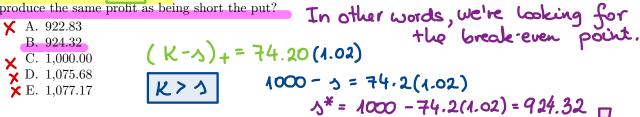
3.3. Puts.

Problem 3.5. The initial price of the market index is \$900. After 3 months the market index is priced at \$915. The nominal rate of interest convertible monthly is 4.8%. The premium on the put, with a strike price of \$930 is \$8.00. What is the profit at expiration for a **long** put?

- \times (a) \$15.00 loss \times (b) \$6.90 loss (c) \$6.90 gain \times (d) \$15.00 gain
 - (e) None of the above.

Problem 3.6. Sample FM(DM) #12

Consider a European put option on a stock index without dividends, with 6 months to expiration, and a strike price of 1,000. Suppose that the nominal annual risk-free rate is 4% convertible semiannually, and that the put costs 74.20 now. What price must the index be in 6 months so that being long the put would produce the same profit as being short the put?



Problem 3.7. Farmer Shaun is producing sweet potatoes. He intends to harvest 10,000-cartons' worth in six months. His total costs are \$12.00 per carton.

He wishes to hedge using European put options. There are two puts on sweet potatoes with the exercise date in six months available: one with the strike price of \$13 per carton and another with the strike price of \$15 per carton. Their premiums are \$0.15 and \$0.18, respectively.

Assume that the prevailing risk-free interest rate is 4% effective for the half-year period.

At harvest time, in six months, it turns out that the sweet-potato spot price equals \$14. What would Farmer Shaun's profit be if he had decided to hedge using the \$13-strike put versus his profit if he had decided to use the \$15-strike put to hedge?