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M339D=M389D Introduction to Actuarial Financial Mathematics University of Texas at Austin Mock Exam One

Instructor: Milica Čudina

All written work handed in by the student is considered to be their own work, prepared without unauthorized assistance.

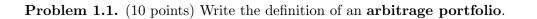
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"The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community. As a student of The University of Texas at Austin, I shall abide by the core values of the University and uphold academic integrity."

"I agree that I have complied with the UT Honor Code during my completion of this exam."

Signature:

The maximum number of points on this exam is 60.



Problem 1.2. (5 points) From a manufacturer's perspective, why would they decide to use derivative securities on their product to hedge? Respond in five lines or less.

Problem 1.3. (5 pts) Consider a portfolio consisting of the following four European options with the same expiration date T on the underlying asset S:

long one call with strike 40,

long two calls with strike 50,

short one call with strike 65.

Let S(T) = 52. What is the payoff from the above position at time T?

Problem 1.4. (5 points) The initial price of the market index is \$900. After 3 months the market index is priced at \$960. The **effective** monthly rate of interest is 1.0%.

The premium on the long put, with a strike price of \$975, is \$10.00. What is the profit at expiration for this long put?

Problem 1.5. (15 points) The continuously compounded risk-free interest rate equals 0.08.

Jonathan sells short one share of a non-dividend-paying stock and simultaneously buys a six-month, \$85-strike call option on the same stock. The current stock price is \$88, while the call price equals \$8. What is the break-even price of Jonathan's position?

Problem 1.6. (20 points) The future value in one year of the total costs of manufacturing a widget is \$200. You will sell a widget in one year at its market price of S(1).

Assume that the annual effective interest rate equals 5%, and that the current price of the widget equals \$230.

You now purchase a one-year, \$220-strike put on one widget for a premium of \$7. You sell some of the potential gain by writing a one-year, \$250-strike call on one widget for a \$2 premium.

What is the **range** of the profit of your hedged porfolio?