Problem Set 1

Instructions: This problem set is due on 1/27 at 11:59 pm CST and is an individual assignment. All problems must be handwritten. Scan your work and submit a PDF file.

Problem 1. Consider the following risk-free securities available to buy or sell to all investors in the market.

Security	Price (t=0)	Cash Flow (t=1)	Cash Flow (t=2)	Cash Flow (t=3)
A	38	40		
B	?		30	
C	16			20
D	298	120	120	120

a. What should be the no-arbitrage price of security B?
b. If security B is trading at 24, is there an arbitrage opportunity? If so, explain how to exploit it.

Problem 2. Consider the following risk-free securities available to buy or sell to all investors in the market.

Security	Price (t=0)	Cash Flow (t=1)	Cash Flow (t=2)	Cash Flow (t=3)
A	76	80		
B	55	20	40	
C	78	20	40	50
D	?		20	
E	?			100

a. What should be the no-arbitrage price of security D?
b. What should be the no-arbitrage price of security E?

Problem 3. An investor receives $1,080 in one year in return for an investment of $1,000 now. Calculate the percentage return per year with:

a. Annual compounding
b. Semiannual compounding
c. Monthly compounding
d. Continuous compounding

Problem 4. An effective annual rate (EAR) of 9% per year is equivalent to which rate expressed per year with continuous compounding?

Problem 5. You have information of cash flows and zero-coupon rates (per year with continuous compounding) for different maturities as shown below:

Time (years)	1	5	10	15	20
Zero-coupon rate (%)	5.0	5.5	6.0	6.0	6.5
Cash flow	100	150	200	250	300

Compute the present value of those cash flows.

Problem 6. Suppose you enter into a 6-month forward contract on a non-dividend-paying stock when the stock price is $100, and the risk-free interest rate is 10% per year with continuous compounding.

a. What is the no-arbitrage forward price?
b. If the forward price is 102, is there an arbitrage opportunity? If so, explain how to exploit it.

Problem 7. You enter in a 1-year long forward contract on a non-dividend-paying stock when the stock price is $50, and the risk-free rate of interest is 10% per year with continuous compounding.

a. What are the forward price and the initial value of the forward contract?
b. Six months later, the price of the stock is $45, and the risk-free interest rate is still 10%.
    i. What are the forward price and the value of the forward contract?
    ii. If you decide to close the forward position, how much do you need to pay or get paid?