2.1. **Prerequisite material.** Please provide your complete solution to the following problem.

**Problem 2.1.** (10 points) By scenario A there is an offer to pay at the rate of $10,000 per annum, continuously, for the next 10 years. By scenario B it is offered to pay the amount $X$ at the end of each of the next 10 years. The force of interest applying to both scenarios is 12%. Find the value of $X$ such that you are indifferent between these two scenarios in the sense that they have the same present values.

2.2. **Transaction costs.** Please, read the following lecture note prior to attempting the remaining problems:

https://www.ma.utexas.edu/users/mcudina/m339d-lecture-two-transaction-costs.pdf

Provide your final answer only for the following problems.

**Problem 2.2.** (5 points) What is the cost of purchasing 100 shares of Jiffy, Inc. stock given that the bid-ask prices are $31.25 – $32.00 and that there is a $15.00 commission per transaction?

(a) $1,293
(b) $3,215
(c) $3,504
(d) $3,264
(e) None of the above.

**Problem 2.3.** (5 points) Source: Prof. Jim Daniel (personal communication).

The bid-ask spread on a share of stock is $98-$102. A 5% commission is paid for either buying or selling. Calculate the round-trip transaction cost.

(a) $14
(b) $10
(c) $6
(d) $4
(e) None of the above.

2.3. **Continuous-dividend-paying assets.** Please provide your complete solution to the following problems.

**Problem 2.4.** (3 points) An investor buys 10 shares of stock which pays a continuous dividend with the dividend yield equal to 0.05. Assume continuous and immediate reinvestment of dividend into the same asset. How many shares does the investor own 2 years from the original purchase?

**Problem 2.5.** (4 points) An investor buys $n_0$ shares of continuous-dividend-paying stock with the aim of owning exactly 10 shares three later. Assume that the dividend yield is equal to 0.02. Assume continuous and immediate reinvestment of dividend into the same asset. Calculate $n_0$. 

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**Instructor:** Milica Ćudina
2.4. **Short sales.** Provide your **final answer** only for the following problems.

**Problem 2.6.** (5 pts) *Source: FM Exam, November 2000, Problem #24.*
Bill and Jane each sell a different stock short for a price of 1000. For both investors, the margin requirement is 50%, and interest on the margin is credited at an annual effective rate of 6%. Their respective brokers keep the short-sale proceeds (without crediting interest).

Bill buys back his stock one year later at a price of \( P \). At the end of the year, just prior to the closing of the short sale, the stock paid a dividend of \( X \).

Jane also buys back her stock after one year, at a price of \((P - 25)\). At the end of the year, just prior to the closing of the short sale, her stock paid a dividend of \( 2X \).

Both investors earned an annual effective yield of 21% on their short sales. Calculate \( P \).

(a) 800  
(b) 825  
(c) 850  
(d) 875  
(e) None of the above

**Problem 2.7.** (5 pts) Assume that an investor opens a 100 share short position in Jiffy, Inc. common stock at the bid-ask price of $32.00-$32.50. When the investor closes his position the bid-ask prices are $32.50-$33.00. If there is a commission rate of 0.5%, calculate the investor’s profit on the short investment (assume \( r = 0 \))?

(a) About $32.50 gain  
(b) About $16.25 loss  
(c) About $132.50 loss  
(d) About $100 gain  
(e) None of the above

**Problem 2.8.** (5 pts) Assume that you (an investor) open a 300−share short position in XYZ common stock at $30.19 with commission of 0.5%. When you close your position the stock price is $29.87 and you have to pay a commission rate of 0.5%. Calculate your profit on this short investment (assume \( r = 0 \))?

(a) About $12.50 gain  
(b) About $5.91 gain  
(c) About $5.91 loss  
(d) About $12.50 loss  
(e) None of the above

Please, provide the **complete** solution to the following problem.

**Problem 2.9.** (8 points) Bertram shorts (i.e., short sells) 100 shares of a non-dividend-paying stock at the initial stock price of $50 per share. He invests the proceeds a the continuously compounded risk-free interest rateof 0.04 in a savings accout. He does not make any subsequent withdrawals from or deposits to this account until the short sale is closed. When Bertram closes the short sale, six months later, the stock price is $55. Does he have enough money in the savings account to be able to close the short sale without using additional funds?