



Principles of Finance

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Assignment 1

Instructions

- Assignments should be done in groups of 2 to 3 students.
- You should remain with the same group through the entire course.
- Submit on Moodle only one copy of solutions per group.
- For each assignment you can get a maximum of 100 points.
- All assignments turned in late will not be graded (zero points).

Due date

The due date is indicated on Moodle.

1. A project you are considering is expected to provide benefits worth \$10,000 in one year and another \$10,000 in three years. If the relevant discount rate is 7%, what is the value of the benefits of this project today? (5 points)
2. An investment opportunity pays off \$4,000 at the end of each of the next three years. This opportunity requires an initial investment of \$1,000 plus an additional investment at the end of the second year of \$5,000. If the interest rate is 2% per year, what is the present value of the costs of this investment? Should you undertake it? (5 points)
3. You are a Swiss investor. Suppose the current exchange rate is \$0.9 to CHF 1. You have an investment opportunity in the US that requires an investment of CHF 250,000 today and will produce a cash flow of \$310,000 in one year with no risk. Should you invest in this opportunity if the risk free rate of interest in the US is 5%? (5 points)

Security	Cash flow today	Cash flow in one year
A	0	100
B	100	0
C	100	100

4. Use the information in the table below to answer this question.

If the prices at which securities C and A are trading are \$180 and \$80 respectively, is there an arbitrage opportunity? What should you do? Explain. (10 points)

5. Use the information in the table below to answer this question.

Year	A	B
0	-150	-250
1	50	150
2	75	150
3	100	-50

If the interest rate is 10%, which investment(s), if any, would you take and why? (5 points)

6. You have a loan outstanding which requires making three annual payments of \$1,000 at the end of the next three years. You have received an offer from your bank to make one large payment at the end of loan's term in three years in lieu of your next two payments. If the interest rate on the loan is 5% what is the maximum final payment you accept to pay instead of your two next payments? (5 points)
7. Your parents put some money in an account for you on the day you were born. You are now 18 years old and are allowed to withdraw the money for the first time. The account currently has \$39,960 in it and pays an 8% interest rate. Answer the following questions: (10 points)
- How much money would be in the account if you left the money there until your 25th birthday?
 - How much money did your parents originally put in the account?
8. Suppose that a young couple plans to send their daughter to private school. Tuition is \$10,000 per year, payable at the beginning of the school year. The couple would like to keep their daughter at private school through high school. You expect tuition to increase at a rate of 5% per year over the 13 years of her schooling. What is the present value of the tuition payments if the interest rate is 5%? How much would the couple need to have in their bank account now to fund all 13 years of tuition? (10 points)

9. You are thinking of buying a new machine that will save you \$1,000 in the first year. The machine will then begin to wear out so that the savings decline at a rate of 2% per year forever. Assume the savings occur at the end of each year. What is the present value of your savings if the interest rate is 5% per year? (10 points)
10. You would like to purchase a house that costs \$350,000. You have \$50,000 in cash and you need to borrow the rest of the purchase price. Your bank is offering a 30-year mortgage that requires annual payments and has an interest rate of 7% per year. Given this information, answer the following questions: (10 points)
- What will your annual payment be if you sign up for this mortgage?
 - You can only afford to pay \$23,500 per year. Your bank agrees to lend you the \$300,000 and pay what you can afford each year, but requires you to make a balloon payment at the end of your mortgage (in 30 years); that is you must repay the remaining balance on the mortgage. How much will this balloon payment be?
11. You are saving for retirement. To live comfortably, you decide you will need to save \$2 million by the time you are 65. Today is your 30th birthday and you decide, starting today and continuing on every birthday up to and including your 65th birthday, that you will put some amount of money into a saving account. Since your income will increase over your lifetime, you decide to let the amount that you set aside grow by 3% per year. If the interest rate is 5% how much will you put in your account today to make sure that you will have \$2 million in the account on your 65th birthday? (15 points)
12. Your grandmother bought an annuity for \$200,000 when she retired. In exchange for the \$200,000, she will be paid \$25,000 per year until she dies. The interest rate is 5%. How long must she live after the day she retired to come out ahead (that is, to get more in value than what paid in)? (10 points)