2 Problem Set 2

Problem 0

1. Determine the present value of the following dated payments (time in years) with a 3% annual interest rate and compound capitalization/discounting (yearly capitalization)
   (a) (1200,1)
   (b) (1456,5)
   (c) (39700,7)
   (d) (45700,1.5)
2. Determine the future value of the following cash payments (today) with a 3% annual interest rate and compound capitalization/discounting (yearly capitalization)
   (a) 1500 today, in 1 year
   (b) 6700 today, in 5 years
   (c) 9800 today, in 10 years
   (d) 670 today, in 0.5 years
3. Repeat 1 and 2 using 3% annual interest rate and simple discount/capitalization (yearly capitalization)

Discount factors and interest rates

Problem 1

If the PV of 150€ that are payable one year from now is 130€, what is the one year discount factor? What is the (annual) interest rate that is applied?

Problem 2

You are asked to think about and compare the following two questions

1. What is the PV of 100€ that are payable in 10 years' time if it capitalizes/discounts at a 10% annual compound interest rate?
2. How much do you have to invest at a 10% annual compound interest rate in order to have 100€ ten years from now?

Problem 3

You have to pay 140.000€ four years from now and you are offered the chance to cancel the debt today if you pay 100.000€. ¿What kind of payment do you prefer, knowing that today you have the 100.000 € and that you can deposit the money at a 8% annual interest rate with annual compounding?

Problem 4

Determine the amount of money that you would have to deposit today in order to have 30.000 euros ten years from now, when the annual interest rate for 10 year deposits is 5%.

Financial Sum

Problem 5

A businessman has the right to collect the following amounts: 1000€ on 1/1/2011, 2500€ on 1/1/2012 and 3000€ on 1/1/2013. Using annual compounding at a yearly interest rate of 6% work out the value of these future payments as of a) 1/1/2011, and as of b) 1/1/2013

Problem 6

Given the following sets of financial capital:

$$A = \{ (10.000, 1) ; (10.000, 2) ; (20.000, 4) \}$$

$$B = \{ (15.000, 0) ; (20.000, 3) \}$$

Determine which of the two is financially preferable according to the compound capitalization rule with an 8% interest rate.

Problem 7

Given the following payments and due dates (financial capital):

$$A=\{ (M;2), (2M;3), (5M;7), (10M;12)\}$$

$$B=\{ (2M;1), (3M;5), (8M;6)\}$$

Determine which of the two sets of financial capital is financially preferable if you use compound capitalization as your financial rule, where the capitalization factor over two years is 1.4.

Problem 8

Mr. X arranged a savings plan on 1/1/06. According to the plan, he committed to provide at the beginning of each year and for a period of three years an amount 500.000 € per year. This he did in order to receive the money after five years. The savings plan using compounding with a 12% annual interest rate. Determine the amount that is available on 1/1/2011.

Extra Questions

Problem Extra 1

1. Find the single dated payment (X,3) that is financially equivalent to the sum of all of the following: (1200,0), (2100,2), (3200,4). Use a 5% annual interest rate with compound capitalization
2. Find the value of X where (3700,5) is the financial equivalent of the sum of the following payments (1500,0), (X,4), (1000,5). Use a 5% annual interest rate with compound capitalization

Past Exam Questions

Problem 9 (EX 2013)

Determine the annual interest rate using annual compound capitalization such that for (an unknown) amount of money that you borrow, the following two methods of payment are equivalent: a) Pay 121.000 euros today and 121.000 euros in 1 year's time, b) Pay 144.000 euros in two year's time and 144.000 in three years.

Problem 10 (EX 2012)

You have won a price of 2 million euros. You are offered to ways to receive the price. Option 1: receive 2 million today– 5% of the price will be deducted to pay as income taxes; Option 2: receive the price annually (first payment in one year) in four payments of half a million euros each time– with this option you do not have to pay income taxes. To solve this, take into account that you can invest the cash in a savings account that gives you a tax-free annual compound interest rate of 3% anual. Which of the two options would you prefer (in financial terms)?

Problem 11 (EX 2011)

Some time ago you arranged the following transaction: you made a large deposit and in exchange you will receive three payments of 10.000€ each from the bank, the first at the end of 2012, the second at the end of 2013, and the third at the end of 2014. The bank has some liquidity problems and asks you postpone the payments so that you receive the payments at the end of 2015, 2016 y 2017. As compensation you will receive additional interest payments with a 5% annual interest rate. Determine the amounts you will receive if today is January 1, 2011, and you receive the interest payments as one lumpsum amount at the end of 2017 (interest is calculated on the amounts and time from the moment they are posponed until they are paid, and on the interest until the end).

Problem 12 (EX 2011)

A company fires one its employees on 1/1/2006 and does not pay him the legal amount which is 18.000 euros. The employee takes the company to court and after 5 years he wins the lawsuit. The judge forces the company to pay the employee the legal amount plus interests, plus the costs of the lawsuit. The judge imposes a legal interest rate of 7% per year. Determine how much the firm has to pay in interest payments only (using annual compound capitalization)

Problem 13 (EX 2017)

You want to buy a house with a market price of 150 000€. The bank will offer you a mortgage that will cover 80% of the price. You have to save to pay the other 20% at the time of the sale, which will be in 4 years' time. The bank offers you a savings deposit with a 2.8% nominal APR and [originally: monthly,] annual capitalization. How much money do you have to deposit in the savings account to have the cash you need for your part of the house price in four years' time?