MA208 Quantitative Techniques for Business

Lecture 15: Systems of linear equations, Matrices

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Lecture 15 - Outline

- Finance Maths: revision and exercises
- System of linear equations
- Matrices

Amortization

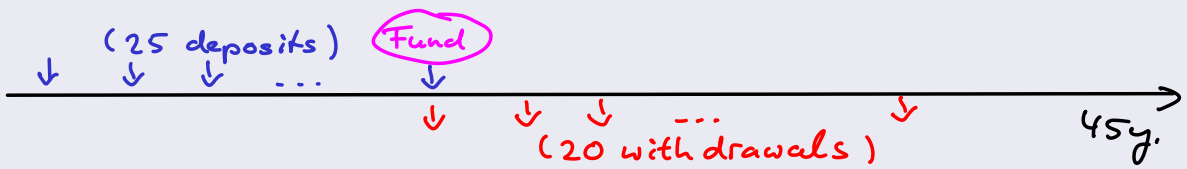
Example

You wish to purchase a retirement plan that earns 6.5% interest compounded annually. You will make annual deposits into this account for 25 years, and then make 20 equal withdrawals of €10,000 reducing the balance to zero. Compute

1. the value of the fund based on the withdrawals,
2. the amount of each deposit in order to maintain the fund,
3. the total interest earned over the entire 45 years.

Solution

It may help to sketch a time line:



Solution

This is what you need to do:

1. Use the Present Value Formula to calculate the fund value.
   (answer: € 110,185.07)

2. Now use the Future Value Formula to calculate the amount of the deposits.
   (answer: € 1871.06)

3. Total interest = (total withdrawals) − (total deposits) = ?

Work through the steps yourself and compare the answers!
(Let me know if I made an error!)

Example

How long, to the nearest day, will it take €20,000 to grow to €300,000 at 9% annual interest compounded monthly?

Solution

Use Compound Interest Formula,

and log's ...

(answer: 30 years and 77 days)

Section IV: Systems of linear equations, Matrices

Systems of linear equations can be used to solve resource allocation problems in business and economics. Such systems can involve many equations in many variables.

In this section we will review methods for solving two linear equations in two variables. We will then introduce matrices and matrix operations to develop a method that is suitable for solving linear systems of any size.

Systems of two linear equations in two variables

Example

If two adult tickets and one child ticket together cost €8, and if one adult ticket and three child tickets together cost €9, what is the price of each ticket?

Solution

This is an exercise for you!