# Introduction to Mathematical Modelling
## Question List 1.
*Golden ratio. Fibonacci numbers. Principle of mathematical induction*

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**1.** What is the golden ratio?
**2.** Give three geometric constructions of the golden ratio.
**3.** What are the golden rectangle and the golden spiral? Draw the picture.
**4.** What are the golden triangle, the golden gnomon, and the golden pyramid?
**5.** Draw a pentagram and indicate three pairs of segments in it which constitute the golden ratio.
**6.** Define the following sets of numbers: natual, integer, rational, real.
**7.** Is the golden ratio a rational number? Explain the answer.
**8.** What is the definition of the Fibonacci numbers? What is their relation to the golden ratio?
**9.** Give the formula for the $n$-th Fionacci number.
**10.** Give the formula for the sum of squares of first $n$ Fibonacci number. What is the Fibonacci spiral? Draw the picture.
**11.** Formulate the Priunciple of Mathematical Induction.
**12.** What is the definition of a general linear regression?
**13.** What is the characteristic polynomial for a linear regression? What is the characteristic polynomial for Fibonacci numbers? Specify its roots.
**14.** What is the algorithm to deduce a formula for the $n$-th element in a linear regression?