# Introduction to Mathematical Software Exercise 8

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**Winter Term 2011/2012**
**Week: 30.01.2012 - 03.02.2012**

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**Problem 1  Binary Representation** ☆☆★

Find a Maple-method that converts a decimal representation of a number to the corresponding binary representation. Convert the following decimal numbers to their binary equivalent:

a) 42

b) 0.5

c) 420!

d) -3.75

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**Problem 2  Prime Numbers** ☆☆★

Use `nextprime` to generate a prime with 5 digits, a prime with 10 digits and a prime with 50 digits.

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**Problem 3  Procedures** ☆☆★

Write a procedure that for $n \in \mathbb{N}$ returns "number has one digit" if $0 \leq n \leq 9$, "number has two digits" if $10 \leq n \leq 99$, "number has three digits" if $100 \leq n \leq 999$ and "number has more then three digits" otherwise.

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**Problem 4  Animation** ☆★★

Use the `animate`-funktion from the `plots`-package to plot $\sin(x + t)$ for $x \in [0, 15]$. As time passes, t shall go from 0 to $4 \cdot \pi$.

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**Problem 5  Piecewise Definition of a Function** ☆★★

Use `piecewise` to define the following function:

$$f(x) = \begin{cases} 0 & \text{für } x < -5 \\ x + 5 & \text{für } -5 \leq x < -3 \\ 1 + \frac{1}{9} \cdot x^2 & \text{für } -3 \leq x < 3 \\ 5 - x & \text{für } 3 \leq x < 5 \\ 0 & \text{für } 5 \leq x \end{cases}$$

Plot $f(x)$ for $x \in [-6, 6]$. Ensure that both axes have the same scaling.