

# NUMERICAL METHODS I:

## Tutorial II: Solutions to specific problems

Aleksejus Kononovicius

Institute of Theoretical Physics and Astronomy, Vilnius University

email: [aleksejus.kononovicius@tfai.vu.lt](mailto:aleksejus.kononovicius@tfai.vu.lt)

www: <http://kononovicius.lt/>



These slides are available under [CC-BY](#) license.

## ETS 1-3: The box

Write a Matlab program that calculates mass of an aluminum box (hollow cuboid) in kg (assume density of aluminum to be  $2.7 \text{ g/cm}^3$ ). The user should be prompted to enter the external measurements (height, width and length) of the box and the thickness of its walls in meters. The program should print out the weight of the box in kg in a nicely formatted sentence.



Image: [D1-TheOne@Pixabay](#)

## ETS 1-5: Sum to one hundred

Write a Matlab program that outputs all possibilities to put + or - or nothing between the numbers from 1 to 9 (in ascending order) such that the result is some target number. The program should prompt the user to enter the target number. For target number 100, one of the possibilities is:

$$1 + 2 + 3 - 4 + 5 + 6 + 78 + 9 = 100.$$



Image: [TheDigitalArtist@Pixabay](#)

## ETS 2-2: Gaussians

Let  $X$  be a standard Gaussian random variable (with  $\mu = 0$ ,  $\sigma = 1$ ).

- Estimate the probability that  $X \in [-1, 1]$ . Compare simulation and theoretical results.
- How does  $P(X \in [-1, 1])$  depend on  $\mu$ ?
- How does  $P(X \in [-1, 1])$  depend on  $\sigma$ ?
- What is the mean and standard deviation of  $X^2$ . How do they depend on  $\mu$  and  $\sigma$  of  $X$ ?



Until next time!

