Technische Universität Berlin   Adjustment Theory I

Chair of Geodesy and   Winter Term 2023/24
Adjustment Theory

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Exercise 1: Introduction to Octave/Matlab

Group:	Surname, First name:	Matriculation number:	Signature*:

* With my signature I declare that I was involved in the elaboration of this homework.
Submission until: **No submission!**

Objective

Octave or Matlab is a high-level technical computing language and interactive environment for algorithm development, data visualization, data analysis, and numerical computation. This exercise intends to procure the basic functions of Octave/Matlab as well as the necessary procedure to solve the next exercises.

Homework: Practise on the tasks of this exercise! No submission of homework.

Hint: If you are not familiar with Octave or Matlab, search on the internet for a free online tutorial.

Use Octave or Matlab to determine the following solutions.

Task 1:
- $x = 4^2$
- $y = \sqrt{4}$
- $z = 4^{-2}$
- $t = 4!$

Task 2 (Right angle triangle):
- Given: $a = 4$ m, $\alpha = 53.1301°$

    o Calculate the hypotenuse

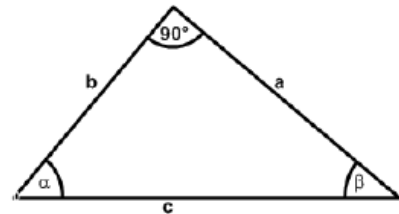- Given: $a = 4$ m, $b = 3$ m

    o Calculate the hypotenuse

Figure 1: Right-angled triangle

Task 3 (General triangle):
- Given: $a = 3$ m, $b = 2$ m, $\gamma = 55°$

    o Calculate the length of c (use the Law of Cosines)

- Given: $a = 4$ m, $b = 3$ m, $\alpha = 30°$
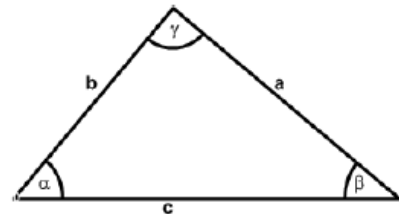
    o Calculate the angle β (use the Law of Sines)

Figure 2: General triangle

Task 4 (Using matrices):
- Calculate the product $\mathbf{C} = \mathbf{AB}^\mathrm{T}$ of the following matrices

    o $\mathbf{A} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 4 & 6 & 5 \\ 8 & 2 & 3 \end{bmatrix}$

- Load the file "*Matrix.txt*" and assign the matrix into a variable $\mathbf{N}$

- Perform the following calculations using matrix $\mathbf{N}$

    o Determinant
    o Rank
    o Inverse
    o Pseudo-inverse
    o Eigenvectors and Eigenvalues