Exercise 11: Adjustment Calculation - part VI

- Trilateration network -

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

* With my signature I declare that I was involved in the elaboration of this homework.

Submission until: **26.01.2025**

Objective

This exercise deals with the adjustment of trilateration networks.

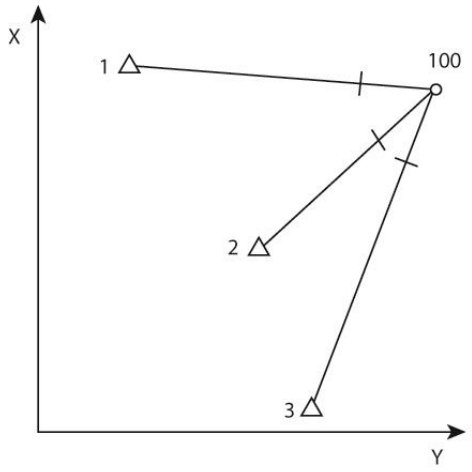

Figure 1: Trilateration network

Table 1: Gauss-Krueger coordinates of control points

Point	Y [m]	X [m]
1	865.400	4527.150
2	2432.550	2047.250
3	2865.220	27.150

Table 2: Observed reduced distances

From	To	s [m]
100	1	6049.000
100	2	4736.830
100	3	5446.490

Task 1:

The measurements of the trilateration network depicted in Figure 1 are listed in Table 2. The points 1, 2 and 3 are control points (error free) and their Gauss-Krueger coordinates are given in Table 1. Calculate the adjusted Gauss-Krueger coordinates of point 100 using least-squares adjustment.

- The measurements are uncorrelated and were obtained with an accuracy of $1\ \mathrm{mm} + 2\ \mathrm{ppm}$.
- Set up an appropriate functional model as well as the observation equations.
- Set up the stochastic model.
- Choose appropriate values for the break-off conditions ϵ and δ and justify your decision.
- Solve the normal equation system and determine the Gauss-Krueger coordinates of point 100 as well as their standard deviations.
- Calculate the residuals and the adjusted observations as well as their standard deviations.

Task 2 (Homework):

The measurements of the trilateration network depicted in Figure 2 are listed in Table 4. The points 1, 2, 3 and 4 are control points (error free) and their Gauss-Krueger coordinates are given in Table 3. Calculate the adjusted Gauss-Krueger coordinates of point P using least-squares adjustment.

- The measurements are uncorrelated and were obtained with an accuracy of $2\ \mathrm{mm} + 2\ \mathrm{ppm}$.
- Set up an appropriate functional model as well as the observation equations.
- Set up the stochastic model.
- Choose appropriate values for the break-off conditions ϵ and δ and justify your decision.
- Solve the normal equation system and determine the Gauss-Krueger coordinates of point P as well as their standard deviations.
- Calculate the residuals and the adjusted observations as well as their standard deviations.

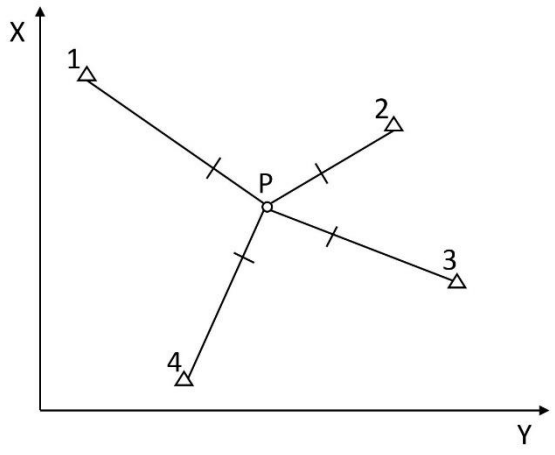

Figure 2: Trilateration network

Table 3: Gauss-Krueger coordinates of control points

Point	Y [m]	X [m]
1	935.411	4316.175
2	2055.452	4036.242
3	2331.535	2136.262
4	1189.218	1324.177

Table 4: Observed reduced distances

From	To	s [m]
P	1	3491.901
P	2	2706.417
P	3	922.862
P	4	1819.298