Technische Universität Berlin

Chair of Geodesy and Adjustment Theory

Prof. Dr.-Ing. Frank Neitzel, M.Sc. Anastasia Pasioti

Exercise 12: Adjustment Calculation - part VII

- Triangulation 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: **10.02.2022**

Test Certificate

Received on: _____ _____ _____

Date Grade Signature

Objective

This exercise deals with the determination of 2D coordinates of points in a plane Cartesian coordinate system from observed directions.

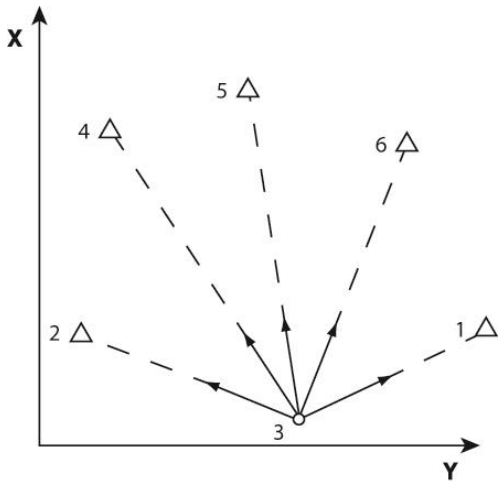

Figure 1: Triangulation network

Table 1: 2D coordinates of control stations

Point	Y [m]	X [m]
1	682.415	321.052
2	203.526	310.527
4	251.992	506.222
5	420.028	522.646
6	594.553	501.494

Table 2: Observed directions

Instrument station	Foresight station	Direction [gon]
3	1	206.9094
	2	46.5027
	4	84.6449
	5	115.5251
	6	155.5891

Task 1:

The observed directions of the triangulation network depicted in Figure 1 are listed in Table 2. The points 1, 2, 4, 5 and 6 are control points (error free) and their 2D coordinates are given in Table 1. Calculate the adjusted coordinates of point 3 using least-squares adjustment.

- The observed directions are uncorrelated and were obtained with an accuracy of 1 mgon.
- 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 2D coordinates of point 3 as well as their standard deviations.
- Calculate the residuals and the adjusted observations as well as their standard deviations.

Task 2 (Homework):

Calculate the adjusted coordinates of point 3 of the triangulation network depicted in Figure 1 while this time using angles as observations (derived from the observed directions).

- Set up the stochastic model for the derived angles.
    - Hint: VCM from VC propagation!
- Set up an appropriate functional model as well as the observation equations.
- Choose appropriate values for the break-off conditions ϵ and δ and justify your decision.
- Solve the normal equation system and determine the 2D coordinates of point 3 as well as their standard deviations.
- Calculate the residuals and the adjusted observations as well as their standard deviations.
- Compare and comment the results with those from task 1.