resection sheet

> - PanZhiQing 24037665g

Three-point resection

0. Get the mean angle of two rounds:

   - A: 144-47-37
   - B: 34-59-1
   - C: 19-8-43

1. From the known coordinates of A, B, and C calculate lengths a and c, and angle α at station B.

   - c: 41.7350262608734
   - a: 6.963461782748601
   - alpha: 169-4-12

2. Subtract the sum of angles x, y, and α in figure ABCP from 360° to obtain the sum of angles A + C

   - A+C: 65-16-53

3. Calculate angles A and C using the following:

   - A: 22-50-21
   - C: 42-26-31

4. From angle A and azimuth AB, calculate azimuth AP in triangle ABP. Then solve for length AP using the law of sines, where $\alpha\alpha1$ = 180° - A - x.Calculate the ΔE and ΔN of AP followed by the coordinates of P.

   - AP: 32.627620918129494
   - azimuthAB: 12-24-10
   - azimuthAP: 35-14-31
   - azimuthAP: 160-53-25
   - **P1: [836537.5406955964, 818647.9981603324]**
   - deltaE: 26.647695596272634 deltaN: 18.827160332497133

5. In the manner outlined in step 4, use triangle BCP to calculate the coordinates of P to obtain a check.

   - CP : 21.70329093140128
   - azimuthBC: 203-19-57
   - azimuthCP: 160-55-6
   - **P2: [836537.5406955964, 818647.9981603324]**
   - deltaE: -20.507304403638898 deltaN: 7.1051603324300645

Leveling

- Given the (arbitrary) RL of BM11 as 25.362 mpd.
- Result : 25.362 + 0.171 = 25.533 mpd.

Appendix

Parameter	Value
meanAngleA	144-47-37

Parameter	Value
meanAngleB	34-59-1
meanAngleC	19-8-43
c	41.7350262608734
a	6.963461782748601
alpha	169-4-12
A+C	65-16-53
X	1.9165460516149735
Y	0.2764310646950353
A	22-50-21
C	42-26-31
AP	32.627620918129494
azimuthAB	12-24-10
azimuthAP	35-14-31
AP	21.70329093140128
azimuthAB	203-19-57
azimuthAP	160-53-25
P1	[836537.5406955964, 818647.9981603324]
deltaE	26.647695596272634
deltaN	18.827160332497133
P2	[836537.5406955964, 818647.9981603324]
deltaE	-20.507304403638898
deltaN	7.1051603324300645
errorE	0.0
errorN	0.0

Script Output

source code: resection.py

```
meanangle: 144-47-37
meanangle: 34-59-1
meanangle: 19-8-43
c: 41.7350262608734
a: 6.963461782748601
alpha: 169-4-12
A+C: 65-16-53
X: 1.9165460516149735
Y: 0.2764310646950353
A: 22-50-21
C: 42-26-31
AP: 32.627620918129494
azimuthAB: 12-24-10
azimuthAP: 35-14-31
AP: 21.70329093140128
azimuthAB: 203-19-57
azimuthAP: 160-53-25
P1: [836537.5406955964, 818647.9981603324] deltaE: 26.647695596272634 deltaN: 18.827160332497133
P2: [836537.5406955964, 818647.9981603324] deltaE: -20.507304403638898 deltaN: 7.1051603324300645
errorE 0.0 errorN 0.0
```

The Hong Kong Polytechnic University
Department of Land Surveying & Geo-Informatics
Surveying Practical Exercise Field Sheet

Date: 09/16/2024 Class: LSGI522 Observer: PAN Zhiqing, XU Siyuan, ZENG Jianwen, ZHOU Kaiwen, ZOU Guohao Booker: PAN Zhiqing

From	To	Face	HCR	VCR	Slope Distance	Mean HCR	Mean VCR	Mean Slope Dist.	Horizontal Dist.	Remarks
STN1	A	L	144 – 52 - 31	89 – 48 - 48	32.664	144-50-9	89-49-8	32.665	32.664	
STN1	B	L	35 - 01 - 55	89 - 20 - 36	17.186	35-0-16	89-20-41	17.186	17.185	
STN1	C	L	19 - 11 - 41	89 - 50 - 11	21.692	19-9-52	89-50-41	21.692	21.692	
STN1	C	R	199 - 08 - 05	270 - 08 - 48	21.692	- -	- -			
STN1	B	R	214 - 58 - 39	270 – 39 - 14	17.186	- -	- -			
STN1	A	R	324 – 47 - 47	270 – 10 - 32	32.665	- -	- -			
			- -	- -	- -	- -	- -			
STN1	A	L	144 - 43 - 34	89 - 50 - 01	32.665	144-45-6	89-49-49	32.665	32.664	
STN1	B	L	34 - 57 - 05	89 - 20 - 41	17.186	34-57-47	89-20-48	17.186	17.185	
STN1	C	L	19 - 07 - 25	89 - 50 - 07	21.691	19-7-35	89-50-42	21.692	21.692	
STN1	C	R	199 - 07 - 46	270 - 08 - 41	21.691	- -	- -			
STN1	B	R	214 - 58 - 29	270 - 39 - 04	17.186	- -	- -			
STN1	A	R	324 - 46 - 39	270 - 10 - 22	32.664	- -	- -			
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Hong Kong Polytechnic University
Department of Land Surveying and Geo-Informatics

Ordinary Levelling Booking Form (Rise and Fall Method)

Locality : BM11   Observer : PAN Zhiqing, XU Siyuan, ZENG Jianwe Date : 09/16/2024
Instrument: Level   Booker : PAN Zhiqing   Group No.: 1

Station	Back Sight	Inter. Sight	Fore Sight	Rise (+)	Fall (-)	Provisional R. Level	Adi.	Reduced Level	Remarks
BM11	1.088					25.362		25.362	
Point1			0.977	0.171		27.072		27.072	