

Ferris State University
Surveying Engineering
Surveying Computation - SURE 215
PROBLEM NUMBER 1
Designed by: S.R. Hashimi
Traverse Computation

Write your answers in the spaces provided

Given Data:

Northing For Point No. 1 = 4559.527 Easting For Point No. 1 = 6232.977

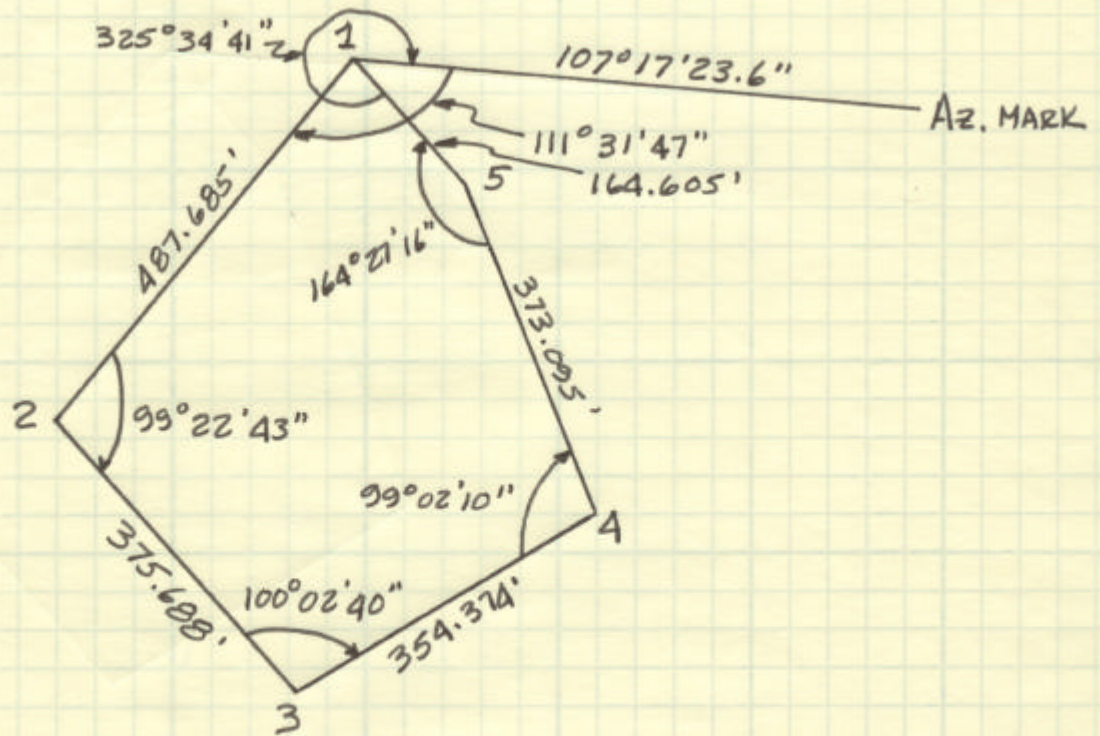
Azimuth From Point 1 To Azimuth Mark 1 = 107 17 23.6

Angle Codes: R = Angle Right, L = Angle Left, D = Deflection Angle

| POINT NO. | DISTANCE | ANGLE in DMS | ANGLE CODE |
|------------------|-----------------|---------------------|-------------------|
| Az. Mark No. 1 | | | |
| 1 | | 111 31 47 | R |
| | 487.685 | | |
| 2 | | 99 22 43 | R |
| | 375.688 | | |
| 3 | | 100 2 40 | R |
| | 354.374 | | |
| 4 | | 99 2 10 | R |
| | 373.095 | | |
| 5 | | 164 27 16 | R |
| | 164.605 | | |
| 1 | | 325 34 41 | R |
| Az. Mark No. 1 | | | |

Compute:

- (a) Angular Error of Closure = _____
- (b) Preliminary Adjusted Azimuths - Prepare A Table For This
- (c) Unadjusted Latitudes and Departures - Prepare A Table For This
- (d) Error in Latitude = _____, Error in Departure = _____
- (e) Total Linear Error and its Direction (Azimuth) = _____
- (f) Relative Error of Closure = _____
- (g) Final Adjusted Traverse (Distances, Azimuths, and Coordinates) Using Compass Rule - Prepare A Table For This
- (h) Compute The Area by DMD and Check by Coordinates = _____



COMPUTATION OF PRELIMINARY AZIMUTHS

| | | |
|----------------|----------------|--|
| $Az_{1-AZ.MK}$ | | $= 107^{\circ} 17' 23.6''$ |
| | $+ \cancel{1}$ | $= \underline{111^{\circ} 31' 47''}$ |
| Az_{1-2} | -180° | $= \underline{218^{\circ} 49' 10.6''}$ |
| | | $= \underline{-180^{\circ} 00' 00''}$ |
| | Az_{2-1} | $= 38^{\circ} 49' 10.6''$ |
| | $+ \cancel{2}$ | $= \underline{99^{\circ} 22' 43''}$ |
| Az_{2-3} | | $= 138^{\circ} 11' 53.6''$ |
| | $+180^{\circ}$ | $= \underline{180^{\circ} 00' 00''}$ |
| | Az_{3-2} | $= 318^{\circ} 11' 53.6''$ |
| | $+ \cancel{3}$ | $= \underline{100^{\circ} 02' 40''}$ |
| | | $418^{\circ} 14' 33.6''$ |
| | -360° | $= \underline{-360^{\circ} 00' 00''}$ |
| Az_{3-4} | | $= 58^{\circ} 14' 33.6''$ |
| | $+180^{\circ}$ | $= \underline{180^{\circ} 00' 00''}$ |
| | Az_{4-3} | $= 238^{\circ} 14' 33.6''$ |
| | $+ \cancel{4}$ | $= \underline{99^{\circ} 02' 10''}$ |
| Az_{4-5} | | $= 337^{\circ} 16' 43.6''$ |
| | -180° | $= \underline{180^{\circ} 00' 00''}$ |
| | Az_{5-4} | $= 157^{\circ} 16' 43.6''$ |
| | $+ \cancel{5}$ | $= \underline{164^{\circ} 21' 16''}$ |
| Az_{5-1} | | $= 321^{\circ} 43' 59.6''$ |
| | -180° | $= \underline{180^{\circ} 00' 00''}$ |
| | Az_{1-5} | $= 141^{\circ} 43' 59.6''$ |
| | $+ \cancel{1}$ | $= \underline{325^{\circ} 34' 41''}$ |
| | | $467^{\circ} 18' 40.6''$ |
| | -360° | $= \underline{360^{\circ} 00' 00''}$ |
| $Az_{1-AZ.MK}$ | | $= 107^{\circ} 18' 40.6''$ |

$$\begin{aligned}
 E_4 &= R-T \\
 &= (107^\circ 18' 40.6'') - (107^\circ 17' 23.6'') \\
 &= 1'17''
 \end{aligned}$$

$$\text{CPA} = -\frac{E_4}{n} = -\frac{77''}{6} = -12.8''$$

PRELIMINARY ADJUSTED AZIMUTHS:

| <u>LINE</u> | <u>PRELIM. AZIMUTH</u> | <u>CORRECTION</u> | <u>ADJUSTED AZIMUTH</u> |
|-------------|------------------------|-------------------|-------------------------|
| 1-2 | 218° 49' 10.6" | -12.8" | 218° 48' 57.8" |
| 2-3 | 138° 11' 53.6" | -25.7" | 138° 11' 27.9" |
| 3-4 | 58° 14' 33.6" | -38.5" | 58° 13' 55.1" |
| 4-5 | 337° 16' 43.6" | -51.3" | 337° 15' 52.3" |
| 5-1 | 321° 43' 59.6" | -64.2" | 321° 42' 55.4" |
| 1-A2.MK | 107° 18' 40.6" | -77.0" | 107° 17' 23.6"✓ |

COMPUTATION OF LATITUDES & DEPARTURES, COMPASS RULE ADJUSTMENT, COORDINATES OF TRAVERSE POINTS, ADJUSTED DISTANCES AND AZIMUTHS AND AREA DETERMINATION ARE SHOWN FROM A SPREADSHEET ON THE FOLLOWING 2 PAGES.

| Sta | Adjusted Distance | Adjusted Azimuth Deg | Min | Sec | DMD | 2A | Coordinates | Accuracy Ratio | Linear Error |
|-----|-------------------|-------------------------|-----|------|---------|-------------|-------------|----------------|--------------|
| 1 | 487.634 | 218 | 48 | 55.2 | -305.65 | 116133.3522 | 26051210. | 27025786. | 0.187 |
| 2 | 375.686 | 138 | 11 | 6.0 | -360.83 | 101031.9102 | 23114057. | 25820604. | |
| 3 | 354.411 | 58 | 13 | 50.1 | 190.96 | 35633.04459 | 25243589. | 25265808. | |
| 4 | 373.110 | 337 | 16 | 12.6 | 348.11 | 119795.4237 | 28704475. | 25885715. | |
| 5 | 164.607 | 321 | 43 | 17.2 | 101.97 | 13176.55363 | 28884369. | 27614015. | |
| | | | | | | | 0. | 0. | |
| | | | | | | | | 385770.284 | |
| | | | | | Area = | 192885.1421 | Area = | 192885.1421 | |
| | | | | | | 4.43 | | 4.43 | |