LAB Solution

Step i) Calculation of horizontal distance of each point from instrument station.

Horizontal distance = Sloped distance x Sin (VA)

From Instrument Station : To :

Point 1 : Slope = 18.548 ft.
Vertical angle 89° 16' 18"
Horizontal distance = 18.547 ft

Point 2 : Slope = 41.276
∠ = 89° 29' 34"
Distance = 41.274 ft

Point 3 :
Slope = 57.220 ft
∠ = 89° 28' 2"
Distance = 57.218

Point 4
Slope = 112.550 ft
∠ = 89° 33' 32"
Distance = 112.547 ft

Point 5
Slope = 46.768
∠ = 89° 29' 32"
Distance = 46.768 ft

Step ii) Calculation of latitude & departure of each point from instrument station.

Latitude of line = Distance x Cos θ
Departure of line = Distance x Sin θ

Where θ is azimuth of line (Horizontal angle)

This can be tabulated in the table below.:

From Instrument Station To:	Horizontal Distance (ft)	Azimuth θ	Latitude (L)	Departure (D)
Point 1	18.547	166° 22' 50"	-18.025	4.367
Point 2	41.274	112° 23' 43"	-15.725	38.161
Point 3	51.218	60° 3' 58"	28.552	42.585
Point 4	112.547	84° 7' 19"	102.719	45.996
Point 5	46.768	33° 54' 17"	46.504	-4.966

Step iii) Calculation of Azimuth of each line & Corresponding length of each line.

Azimuth of a line between 2 points = $\tan^{-1}\left(\frac{\text{Difference in East Coordinates}}{\text{Difference in North Coordinates}}\right)$

Length of line between 2 points = $\sqrt{(\text{Diff in East Coordinates})^2 + (\text{Diff in North Coordinates})^2}$

Line 1 - 2

Difference in North Coords: 2.300

" " East coords: 33.794

$\tan\theta$ = 14.69304

Azimuth θ = 86° 6' 23"

Quadrant correction: 0°

Final azimuth θ = 86° 6' 23"

length: 33.872 ft.

Line 2-3

Diff in N. Coord = 44.277
" " E. Coord = 11.494
Tan θ = 0.25801
Azimuth θ = 14° 28' 23"
Quadrant Corrections 0°
Final Azimuth θ = 14° 28' 3"

Length = 45.727 ft.

Line 3-4

Diff in N. Coord = 74.167
" " E. Coord = -3.589
Tan θ = -0.04839
Azimuth θ = -2° 46' -14"
Quadrant Correction = 360°
Final Azimuth θ = 357° 13' 46"

Length = 74.254 ft.

Line 4-5

Diff in N. Coord = -56.215
" " E. Coord = -50.962
Tan θ = 0.90656
Azimuth θ = 42° 11' 39"
Quadrant Corrections = 180°
Final Azimuth θ = 222° 11' 39"
Length = 75.877 ft.

Line 5-1

Diff in N. Coord = -64.529
Diff in E. Coord = 9.333
Tan θ = -0.14463
Azimuth θ = -8°-13'-47"
Quadrant Correction = 180°
Final Azimuth θ = 171° 46' 13"
Length = 65.2 ft

Step 4) Interior Angles Between lines

To get this we have to calculate the counter-clockwise traverse.

∴ ∠ btw lines = azimuth of preceeding lines - (azimuth of back line + 180)

∠ Point 1 = 86° 6' 23" - (171° 46' 13" + 180°) = 94° 20' 10"

∠ Point 2 = 14° 28' 3" - (86° 6' 23" + 180°) = 108° 21' 40"

∠ Point 3 = 351° 13' 46" - 14° 28' 3" + 180° = 162° 45' 43"

∠ Point 4 = 222° 11' 39" - 357° 13' 46" + 180° = 44° 57' 53"

∠ Point 5 = 171° 46' 13" - 222° 11' 39" + 180 = 129° 34' 34"