

Reduction of the Distances  
By Mitchell's method

Dist. 0 to 0 —  
 67° 03' — 49° 22' — 43° 41' 57"

Sum	116 25	} $\frac{1}{2} = 58, 12$ Co. T' = 9.7924	} O. Ref. 24		
Diff	17 41			} $\frac{1}{2} = 0, 50$ - T' = 9.1915	} 0.30 24
Dist.	43 42				
	Jan 13 31	Sum = 9.3000			
	x - 0' 20	Co. T' 10.0342			
	O. Alt. - 67 03	Co. T' 9.6260			
	O. Cor.	2' P. Log = 2.7112			
	1' Cor. + 7"	= 3.1722			

71.0. O. Log	10.4743	True A = 13°, 31'
Co. S. Alt.	9.0137	$\frac{1}{2}$ Dist. - 21 51
Alt 39' 19"	= 6606	Sum 35 22
2' 13" 49	Co. D. Alt.	30' 30" P. Log = 0.6690
2' 30' 30	Co. D. Alt.	30' 30" P. Log = 0.6690
		2' Cor 231 51" = .7522

Co. D - 30' 30"		Dist - 43° 41' 57"
2' Cor 31 51		+ 17" = 1' Cor
Sum 70 21	Co. T' = 1.4325	
O. Alt 43 10	T' = 9.9722	
Co. Log with	1.5020	
4"	= 3.3947	

  

		31 51
		43 10 13
		43 10 19

Co. T' Out  
True Out

# 11 Lyons

67° 03' - 49° 22' - 43° 41' 57" *Exp. Ref*

$$\begin{array}{r} 43.42.46 \\ 32.33 \\ \hline 43.10.13 \\ 5 \\ \hline 43.10.18 \end{array}$$

$$\begin{array}{r} 167 - 2.2237 \\ 100 \\ \hline 167 - 2.2237 \end{array}$$

O. M. Co. St. 67.03 = .0350  
 Distance Line 43.43 = 9.0395  
 H. O. Prof. Log  $1^{\circ} 20' 29''$  = .4743  
 $1^{\circ} 20' 29''$  = .3496

D. M. 49° 22' Co. St. = .1190  
 Dist. 43.43 Tang. = 9.9005  
 H. O. P. L. = 4743

$$\begin{array}{r} 47' 56'' \\ 1 20 29 \\ \hline 32 33 \end{array}$$

True Dist 43° 10' 10"

# Dunn

67° 3' - 49° 22' - 43° 41' 57"

O. M. - 67.03  
 D. M. - 49.22

Co. Ref.  $43.41.57$  L  
 $43.42.43$  D *Line* 9.0395  
 O. M. Co. St. 49.22 = 0.0350

H. O. P. L. = 4743  
 $1^{\circ} 20' 29'' = .3496$  *Line*  
 Dist. 43.42.43 = 9.9004 *Tang*

D. M. - 49.22 - 10.1190 *Co. St.*  
 H. O. P. L. = 4743

$$\begin{array}{r} 12 \frac{1}{2} \\ 7 \frac{1}{2} \\ \hline 5'' \end{array}$$

H. O. P. L. = 4743  
 $1^{\circ} 20' 29''$  = .3496  
 Dist. 43.42.43 = 9.9004  
 D. M. - 49.22 - 10.1190  
 H. O. P. L. = 4743

$$\begin{array}{r} 43.41.57 \\ 43.10.22 \end{array}$$

$$\begin{array}{r} 27.35 \\ 13.55 \\ \hline 43.31.30 \\ 43.41.57 \\ \hline 43.10.22 \end{array}$$

# De Borda

$a$   $67^{\circ}03' 44.22$   $-D$   $43^{\circ} 41' 47''$   
 $D$   $43 41.47$   
 $a$   $67.03$   


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 $a+b+D$   $160.06 47$   
 $\frac{2}{a+b+D}$   $00. 3' 23$   
 $\frac{2}{D-a+b}$   $36. 21 36$   
 $\frac{2}{A}$   $67 2. 40$   
 $\frac{2}{B}$   $50. 0 30$   


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 $a$   $- 67 03.00$  N.C. Cos.  $0.4090159$   
 $b$   $- 49 - 22.06$  N.C. Cos.  $0.1862750$   
 $a+b+D$   $00, 03.23$  Cos.  $-9.2372392$   
 $\frac{2}{D-a+b}$   $36. 21.36$  Cos.  $-9.9059620$   
 $\frac{2}{A}$   $67 2.40$  Cos.  $-9.5910035$   
 $\frac{2}{B}$   $50. 0. 30$  Cos.  $-9.0079922$   


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 $\frac{1}{2} 39.1375670$   
 $\frac{1}{2} 19.5687039$   
 $\frac{A+B}{2}$   $50, 31 35$  Cos.  $9.7177505$   
 $\frac{2}{\text{true}} 45.12. 14$  Sin.  $9.0510250$   
 $\frac{2}{\text{true}} 44 47 46$  Cos.  $9.0479340$   
 $\frac{A+B}{2}$   $50. 31. 35$  Cos.  $9.7177505$   
 $\frac{2}{21. 35. 3\frac{1}{2}}$  Sin.  $9.5656925$   


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 $43. 10 + \frac{7}{10}$  Dist.  $43 10. 17$  True Dist.

# Lambre

$a+b+D$   $00^{\circ} 3. 23$  Cos.  $= 9.2372392$   
 $\frac{2}{D-a+b}$   $36. 21 36$  Cos.  $= 9.9059620$   
 $\frac{2}{A}$   $67, 2, 40$  Cos.  $= 9.5910085$   
 $\frac{2}{B}$   $50, 0 30$  Cos.  $= 9.0079922$   
 $a$   $- 67 3$  N.C. Cos.  $= 0.4090159$   
 $b$   $- 49. 22$  N.C. Cos.  $= 0.1862750$   
 $\frac{2}{\text{Log.}}$   $2$   $= 0.3010300$   


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 $15, 56, 3$  Sin.  $= 9.4305970$   


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 $13, 56, 3$  N.S.  $2745327$   
 $\frac{A+B}{2}$   $117 3 10$  N. Cos.  $4540110$   


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 $\text{Dist}$   $43^{\circ} 10, 7$  N. Cos.  $= 7293437$   
 $\frac{7}{10}$   
 $43. 10, 17$  True Distance

N. B.  $10''$  added in this sum the preceding calculation is in error the Distances having been, by mistake made  $43^{\circ} 41' 47''$  instead of  $43^{\circ} 41' 57''$  as in all the others. — The true Distance will not be sensibly affected by this error.

# Spherical Solutions

## First Method

## Second Method

Spherical Solutions

Third Method

$\begin{matrix} \text{ap: } 72 = 67 & 3 & - & 49.22 & - & 43, 41.57'' \\ \text{7. Ditto } 67 & 2 & 39 & - & 50.0.30 & - & 710. 60' 23'' \end{matrix}$

$\begin{matrix} \text{ap: } 72 & \text{D: } 32 & - & 40.50 & - & \text{S.M.O. } 4090159 \\ \text{7. Ditto } 67 & 2 & 39 & - & 50.0.30 & - & \text{S.A.C. } 0.1062750 \\ \hline & & & & & & + 107 \quad 1657 \end{matrix}$

$\begin{matrix} \text{Remainder } \left\{ \begin{matrix} 53.30 & 20 & \text{Sum.} & 9.7079100 \\ 30.41 & 20 & \text{S.} & - 9.3523433 \\ 13.0 & 20 & \text{S.} & - 9.5910005 \end{matrix} \right. \\ \text{D: } 7.3 & \text{Dut } 22 & 57 & 21 & \text{S.} & - & 9.0079922 \\ \text{D: } \text{Ditto } 39 & 59 & 30 & \text{S.} & - & 9.0546337 \\ \hline & & & & & & + 39.0546337 \end{matrix}$

$\begin{matrix} \frac{1}{2} \text{ Diff. } 7.3 & \text{Dut: } 0^{\circ} 31' 4'' & \text{S.} & 9.1706020 \\ \text{an } 66^{\circ} 15' 31'' & \text{S.} & 9.9615976 \\ \hline \frac{1}{2} \text{ True } \text{Dut: } & 21^{\circ} 35' 0'' & \text{S.} & 9.5657192 \\ \hline \text{True } \text{Dut} & - & 43 & 10 & 76 \end{matrix}$

N.B. This is, in my opinion, the  
 best mode of Calculating on Spherical  
 Calculus 27<sup>th</sup> July 1790-

Mathematics

Penthoris farther improved

67.3 - 49° 22' - 43. 41. 57" <sup>D</sup> <sub>Out</sub>

49.22 21. 50. 50 <sub>Out</sub>

17 41 0. 50. 30 <sub>Sum</sub>

0 50.30 9.707919 30. 41. 20 <sub>Diff</sub>

9.352343 13. 00

9.994397 Feb 9

0.301030 - 2 Constant

.355609 = 22602

x True Alt. 17° 2' 10" = 95612 N. cosine

True Out - 43. 10. 21 = 72930 N. cosine

Cast with —