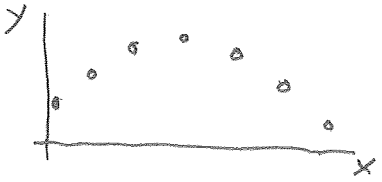
Data Adjustment – Homework 1

assigned Wed, 10 Sept., due Fri, 19 Sept. Submitted results must be YOUR OWN WORK.

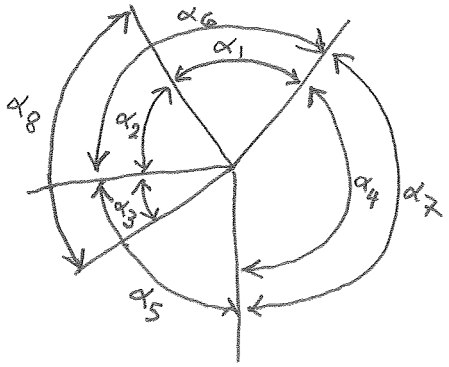
Solve the LS problems, show analysis (counting n, n_0, r), If Ind. Obs. show the parameters you have chosen, show condition equations, show matrices, show parameters, residuals, adjusted observations, show enough digits [format long g]
Use matrix methods

1. model is 2nd order plane curve of form $\boxed{y = a_0 + a_1 X + a_2 X^2}$
X_i constant, Y_i observations. solve by indirect observations. Observations are of equal precision and uncorrelated.



x	0	1	2	3	4	5	6
y	3.244	4.142	4.746	4.959	4.652	4.271	3.216

2. model is angles around the horizon at a point. (a) solve by indirect observations (b) solve again by observations only. Use the given weight matrix.



$$W = \begin{bmatrix} 1 & & & & & & & \\ & 1 & & & & 0 & & \\ & & 1 & & & & & \\ & & & 2 & & & & \\ & & & & 2 & & & \\ & & & & & 2 & & \\ & 0 & & & & & 1 & \\ & & & & & & & 1 \end{bmatrix}$$

#	1	2	3	4	5	6	7	8
α	64°.92	50.13	24°.82	160°.02	85°.02	114°.93	159.98	74.97

3. Model is 2D, 4-parameter conformal coordinate transformation
X,Y constant, x,y observations

$$\boxed{\begin{aligned} x &= aX + bY + c \\ y &= -bX + aY + d \end{aligned}}$$

equivalent to
scale
rotation
shift x
shift y

#	X	Y	x	y	σ_x	σ_y
1	1	1	7.299	0.696	.02	.02
2	1	2	7.612	2.721	.02	.02
3	2	1	9.300	0.387	.01	.01
4	2	2	9.622	2.382	.02	.02

Matlab or other matrix computing environment highly recommended.