Homework 1. Adj. of Geospatial Observations

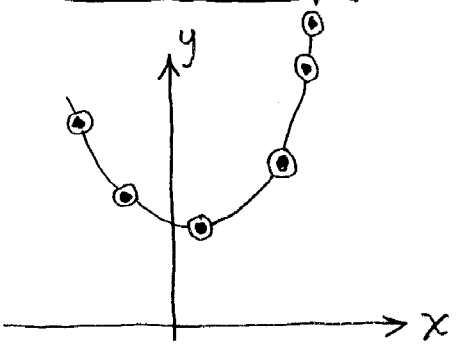
assigned Friday 5 Sept, due ~~Monday 15 Sept.~~ Tues. 16 Sept.

Longhand LS solutions — show all steps

1. Use the indirect observation method to fit the given points to a curve of the form

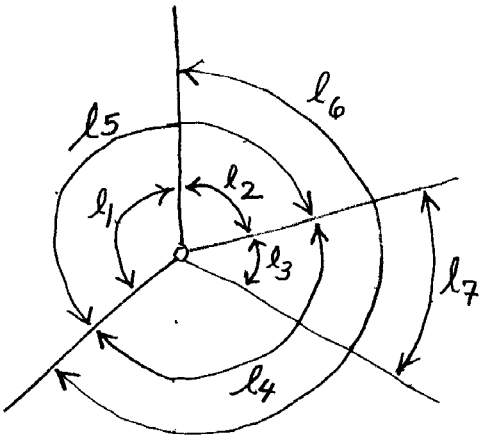
$$Y = a_0 + a_1 X + a_2 X^2$$

X coordinates constant, y coordinates are observations — all observations equally weighted.



X	Y
-4.8	7.2
-2.5	4.9
1.2	4.2
4.9	6.9
6.0	9.6
6.6	12.8

2. (a)

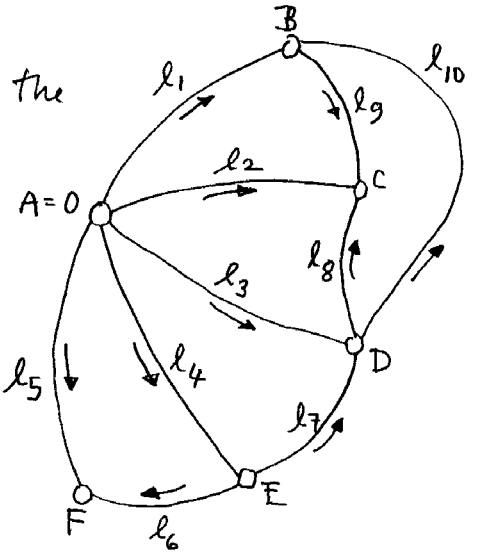


l_1	120°
l_2	82°
l_3	40°
l_4	166°
l_5	203°
l_6	238°
l_7	41°

Use the indirect observation method to adjust the given angle figure. All observations are equally weighted.

2. (b) Solve problem 2(a) using the observation only method with Lagrange Multipliers.

3. Adjust the level network by the method of observations only using substitution. Observations are elevation differences between the stations. The arrows point up hill. Observations are equally weighted.



l_1	19.5
l_2	21.8
l_3	15.3
l_4	10.4
l_5	11.7
l_6	1.9
l_7	4.7
l_8	7.3
l_9	1.8
l_{10}	5.1

4. A vehicle moving at constant velocity passes an initial point at time $t_0 = 0$, with odometer (distance) set to $d_0 = 0$, both considered errorless. At subsequent times t_1, t_2, t_3, t_4 (errorless) the odometer observations d_1, d_2, d_3, d_4 are made. Analyze the adjustment problem giving n, n_0, and r. Write the condition equations for the observation only method.