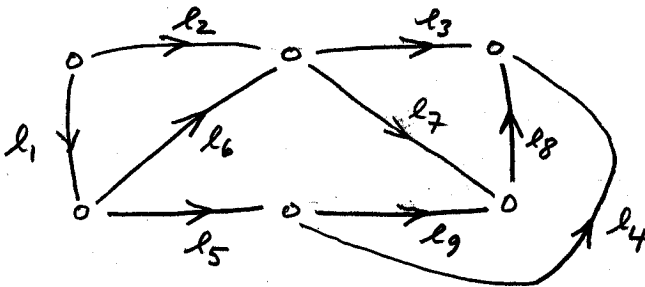


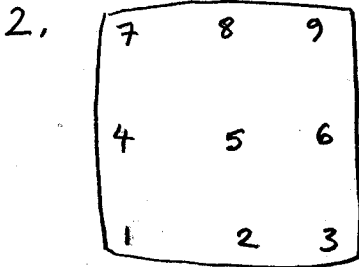
CE 506 Homework 3, Fall 2006
 assigned Friday 6-Oct, due Tuesday 17-Oct

Use MATRIX method for all 4 problems. First 2 are linear, second 2 are nonlinear.

1. Solve level network by observations only. Observations are equal precision and uncorrelated.

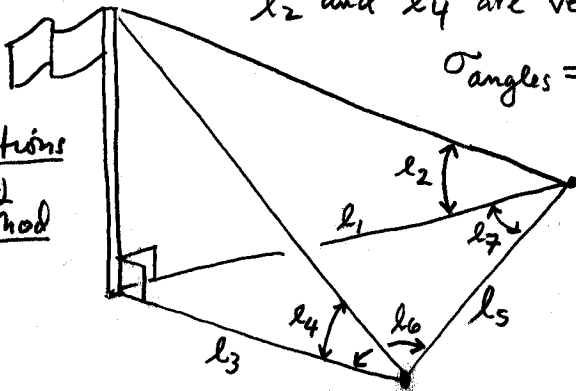


$$l = \begin{bmatrix} 9.95 \\ 14.96 \\ 6.23 \\ 7.77 \\ 3.09 \\ 4.85 \\ 2.97 \\ 2.94 \\ 4.99 \end{bmatrix}$$



There are 9 points in a network surveyed by GPS. The results of the survey are coordinate differences between points. Point 1 fixed at (0,0,0). Use least squares indirect observations to determine remaining 8 point coordinates. find hw3-2.mat in <http://ecn.purdue.edu/bethel> containing 18 rows of [from to dx dy dz]. dx, dy, dz are our observations (54 of them). $\sigma = 5\text{cm}$, all observations.

3. We observe the shown survey network to determine the height of the pole. 3 ground points are in a horizontal plane. angles l_2 and l_4 are vertical angles. $\sigma_{\text{lengths}} = 0.05$,

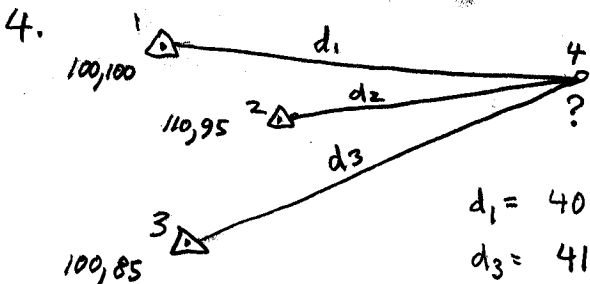


$$\sigma_{\text{angles}} = 0.029 \text{ deg.}$$

observations only method

{ remember, for trig functions & calculus you must use radians }

$$l = \begin{bmatrix} 110.02 \\ 19.977 \\ 99.98 \\ 21.744 \\ 80.07 \\ 74.423 \\ 61.130 \end{bmatrix}$$



Horizontal distances are observed from fixed control points 1, 2, 3 to point 4. Use indirect observations to determine coordinates of point 4.

$$d_1 = 40.11, \sigma_1 = 0.1; \quad d_2 = 30.07, \sigma_2 = 0.1$$

$$d_3 = 41.56, \sigma_3 = 0.2$$