

Data 1 Homework 2
assigned 20 Sept 2009, due 28 Sept. (Monday) $\frac{1}{2}$

1. generate 10,000 normally distributed random numbers with mean 0, std. dev 1, in Matlab by:

$$X = \text{random}('norm', 0, 1, 10000, 1);$$

From these generate 2 new random variables =

- (1) 2500 samples of Y , obtained by taking mean of each group of 4 values of X .

$$Y_1 = (X_1 + X_2 + X_3 + X_4)/4, \quad Y_2 = (X_5 + X_6 + X_7 + X_8)/4, \text{ etc.}$$

- (2) 625 samples of Z , obtained by taking mean of each group of 16 values of X

$$Z_1 = (X_1 + X_2 + \dots + X_{16})/16, \quad Z_2 = (X_{17} + X_{18} + \dots + X_{32})/16, \text{ etc.}$$

Find the mean and std. dev. of X , Y , and Z

compute histograms for X , Y , and Z by:

$$[h, s] = \text{hist}(X); \text{ etc.}$$

For each case (X, Y, Z):

- (1) determine bin width Δs

- (2) compute summation $A = \sum_{i=1}^{10} h_i \cdot \Delta s$ (total area of hist. bars)

- (3) compute normalized histogram values =

$$g_i = h_i/A \quad \text{such that} \quad \sum_{i=1}^{10} g_i \cdot \Delta s = 1$$

- (4) plot the normalized histogram using $\text{bar}(s, g)$;
rescale the axes using $\text{axis}([-4 \ 4 \ 0 \ 1.5])$;

Compare the 3 plots $\&$ 3 corresponding means + std. dev.'s.
Any comments on differences?

2. Solve the surface fit problem using Indirect Observations and the matrix approach. z : observed, x, y : constant. 2/2

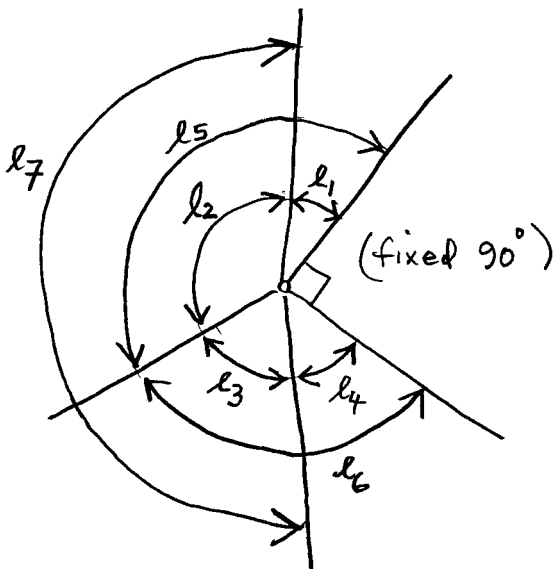
model: $z = a_0 + a_1 x + a_2 y + a_3 xy$ (bilinear surface)

data:

point	z	x	y	σ_z
1	1.59	1	1	0.1
2	1.74	2	1	0.1
3	2.36	3	1	0.1
4	1.79	1	2	0.1
5	2.40	2	2	0.01
6	2.94	3	2	0.1
7	2.19	1	3	0.1
8	2.81	2	3	0.1
9	3.43	3	3	0.1

summarize results and turn in your script (m-file).

3. Adjust the angle figure using Observations Only and the matrix approach.



- l_1 29.87 (deg)
- l_2 144.80
- l_3 50.31
- l_4 44.59
- l_5 174.32
- l_6 94.79
- l_7 195.07

$$\sigma_l = 0.5 \text{ deg}$$

summarize results and turn in your script (m-file).