Homework 4 CE697 Adv. Data Adj

assigned 7 July, Thurs due Tues. 19 July

1. Use (a) Data Snooping ($\alpha_0 = .001$, $\beta_0 = 0.2$), (b) Iteratively Reweighted Least Squares, and (c) L_1 norm minimization to find the blunder(s) in the following data, with given model & uncertainty:

$$\begin{bmatrix} x \\ y \end{bmatrix} = \lambda \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} X \\ Y \end{bmatrix} + \begin{bmatrix} t_x \\ t_y \end{bmatrix}$$

(observed) (constant)

#	X	Y	x	y
1	9.56	3.73	25.17	11.82
2	4.62	3.58	15.85	13.74
3	1.41	8.62	10.76	24.76
4	9.19	7.67	25.84	20.18
5	2.41	3.01	10.84	12.81
6	1.72	5.94	10.21	19.23
7	7.97	5.40	27.63	15.79
8	7.30	0.31	19.36	6.08
9	7.07	5.51	20.65	16.51
10	2.33	0.32	10.09	7.68
11	3.18	1.28	11.47	9.19
12	4.99	7.26	17.35	20.79
	const.		obs.	

$\sigma_x = \sigma_y = 0.2$

2. See the list of data on the following page, (X constant, y observed; $\sigma = 0.05$). Find the inliers/outliers for the model

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

using RANSAC

#	x	y
1	3.845	2.317
2	1.638	2.597
3	1.734	0.527
4	1.960	1.667
5	4.159	2.617
6	1.406	1.623
7	0.632	0.521
8	1.896	0.964
9	3.895	2.438
10	4.309	0.589
11	2.516	1.001
12	0.410	1.857
13	3.303	1.698
14	3.518	2.390
15	1.018	0.520
16	1.074	2.100
17	1.959	0.762
18	2.458	2.953
19	0.510	0.503
20	0.183	0.940
21	4.598	3.308
22	3.150	2.774
23	2.776	1.137
34	0.785	1.941
25	3.021	1.504
26	4.272	2.994
27	1.122	0.516
28	2.315	0.116
29	4.270	2.861
30	2.405	2.719
31	2.333	0.850
32	2.097	2.715
33	0.805	0.561
34	1.025	2.134
35	2.279	0.854
36	4.431	1.506
37	3.500	1.923
38	2.338	1.760
39	1.487	0.568
40	2.688	2.082
41	2.850	1.237
42	0.578	2.677