Problem 1: Editing Data with Linear Least Squares

Students collect marble data and are wondering if they should remove any of the data to get a better fit. There are 10 student collected samples are xoi = [1 2 3 4 5 6 7 8 9 10] and yoi = [1 2 2 3 4 4 5 7 9 9]. Assume the mathematical model is y = alpha + beta*x. Find the best estimate of the state. Determine what detecting and eliminating a bad data point would do to the state. What happenings to the errors and confidence values if you remove a bad data point?

Problem 2: Weighted Least-Squares

Using the following data taken from a site at 40 deg N, 110 W, 2000 m high, what are the orbital elements and r and v vectors? What is your confidence in the data if possible to give? What is your error ellipsoid if possible to give? For the weighted least squares the bias data is 0.0017 degs in right ascension and 0.0010 degs in declination.

Date	hh:mm:ss	Right Ascension (degs)	Declination (degs)
1996 02 26	07:40:00	48.7539698	-4.5195195
1996 02 26	08:00:00	53.7702524	-4.2555627
1996 02 26	08:20:00	58.7873608	-3.9997397
1996 02 26	08:40:00	63.8054128	-3.7540275
1996 02 26	09:00:00	68.8244967	-3.5203280
1996 02 26	09:20:00	73.8659412	-3.3004530
1996 02 26	09:40:00	78.8659412	-3.0961098
1996 02 26	10:00:00	83.8882968	-2.9088868
1996 02 26	10:20:00	88.9116713	-2.7402413

Problem 3: Sequential Batch Filter

You have previously calculated a nominal state for a satellite observed with radar data to be
rvect 5748.60114991 2679.72874263 3443.00728717 km
vvect 4.33046211 -1.92286233 -5.72656403 km/s

You get new observations that yield matrices:
atwa =
216.7346 327.1327 42.7977 35411.4705 55076.9922 4684.2902
327.1327 785.4208 87.5320 51191.8404 128003.7108 8758.9867
42.7977 87.5320 62.3664 5791.8322 11727.0485 9613.1211
35411.4705 51191.8404 5791.8322 5929294.3651 8844731.2848 597965.6811
55076.9922 128003.7108 11727.0485 8844731.2848 21446311.1547 1038893.8970
4684.2902 8758.9867 9613.1211 597965.6811 1038893.8970 1555196.0843

atwb =
19.8969
-18.1124
-0.2737

3815.5860
-3395.8956
69.3738

Find Xhat and P and determine how the state is effected by the new observations.