

Problem Set 6
May 31, 2007

- 1) Taylor P8.4, page 200.
- 2) Taylor P8.10, page 201. Just do the first part of the problem (weighted LSQ estimate of A and B). Skip everything after “Compare.....”
- 3) Suppose our variables x and y are related by:
$$y = \alpha x + \beta x^3$$
Assume we have n measurement pairs: $(x_i, y_i \pm \sigma)$ (all y 's have the same uncertainty, σ). Use the method of Least Squares to derive formulas for the best estimate of α and β .
- 4) Use the WEB, the SEL Library, notes, whatever, to answer the following questions (in one or two sentences):
 - a) What is the difference between two variables that are *uncorrelated* and two variables that are *independent*?
 - b) What is a “student’s t-distribution” and when is it used?
 - c) What is a “Kolmogorov Test” and when is it used?
 - d) What is a “Run Test” and when is it used?
- 5) Suppose the size of nanotubes is given by a Gaussian distribution with mean = 6 nm and standard deviation = 1nm.
 - a) What is the 90% Confidence Interval (symmetric) for the size of these nanotubes?
 - b) What is the confidence level for measuring a nanotube with size ≥ 8 nm?