

**Problem Set 6**  
**Due May 31, 2011**

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,  $\sigma$ ).

Use the method of Least Squares to derive formulas for the best estimate of  $\alpha$  and  $\beta$ .

4) Suppose the size of nanotubes is given by a Gaussian distribution with mean = 6 nm and standard deviation = 1 nm.

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  $\geq 8$  nm?