MATH 245, Spring 2013
Homework 2
due 10:45am on Wednesday, February 19.

Background reading: Section 1.3 to page 25 and Section 1.4.

Follow the posted homework guidelines when completing this assignment.

You may not use any resources other than class material, your Math Modeling classmates, and your professor.

Don't forget to include acknowledgments for those who helped you with the assignment!

2-1. (8 pts) Here is some data that represents an independent variable x and a dependent variable y.

x	1	2	5	7	9	11	13	15	16	18	21	24	28
y	12	15	7	24	26	19	35	70	71	87	144	174	370

It is thought that y satisfies a function of type (a) $y = Cx^k$ or type (b) $y = Ck^x$, but it is not known which one is more likely.

- Use the method of transforming the data using logarithms combined with **visual fitting** to determine the curve of best fit. (Use graph paper.)
  Do this twice—once for a curve of type (a) and once for a curve of type (b).
- Now compare and contrast your two curves of best fit. Create the residual graphs for each fit. In a paragraph or two, discuss which one you think gives a better fit and why.

2-2. (6 pts) Read http://eagereyes.org/criticism/anscombes-quartet. This question is to understand the set of four figures in the middle of the page.

Write three paragraphs explaining this blog post in the context of this class, addressing the following points.

- Explain what makes the four data sets similar; why are they grouped together?
- Discuss the differences in the figures; does the "line of best fit" fit one of the sets of data better than another?
- What does "best fit" mean in this context?
- Last, given these four figures and the lines of best fit, how would you modify your modeling approach to find a better fit to each data set (if necessary).

2-3. (6 pts) Here is some data related to the growth of a plant after grafting:

Months after grafting	1	2	3	4	5	6
Height, in inches	0.8	2.4	4.0	5.1	7.3	9.4

(a) Do a **linear** regression **by hand** to determine the best fit line. Work under the assumption that the height (h) is *proportional* to the time (t).

(b) Use the model from part (a) to predict the height of the graft at four and one-half months and again the height of the graft at 5 years. Which prediction is more reliable? Give specific reasons why one might be more reliable than the other.