MATH 245, Spring 2013
Homework 3
due 10:50am on Wednesday, February 27.

Background reading: Sections 1.4, 3.2, and 3.3.

Follow the posted homework guidelines when completing this assignment.

3-1. (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).

3-2. (7 pts) In the chart on Page 42, you have population data of the United States from 1900–1970.

(a) Include recent data on population from the years 1980, 1990, 2000, 2010, and 2012 to update this chart.

(b) Does the original model appear to still be accurate? Explain why you say this. Would you use the given model to predict the US population in 2050? Why or why not?

(c) Using *Mathematica*, create a new model that aims to give a better model for the population of the United States for the years up through 2050.

- Explain your reasoning (including simplifying assumptions) for giving the model you provide.
- What does your model predict that the population of the United States will be in 2050?
- What is your intuition about the quality of your prediction?
- How might you improve your prediction even further given more time and resources?

3-3. (7 pts) Exercise 3.3.1 is on pages 178–179 of our textbook.

(a) 3.3.1(a)

(b) 3.3.1(b); use *Mathematica* to calculate the regression line between density and speed.

(c) Suppose that your model was commissioned by a city planner who was concerned about the traffic in the area. Discuss the implications of the formula you determine and use your model to justify some recommendations for the city planner.