Preface

These notes are being written to address a need that I perceive for an introductory statistics text that is geared toward engineers rather than epidemiologists. The difference in the need is based on the fact that engineers are often dealing with data from experiments where there is a mathematical model describing the relation between the input to the experiment and the output. For example, one might try to estimate a heat transfer coefficient by examining the temperature distribution along a rod heated at one end. There is a model connecting this temperature distribution to the heat transfer coefficient. The experimentalist will want to compare the theoretical distribution to the measured one to estimate the heat transfer coefficient. This is in contrast to a typical experiment in the social sciences where the only clear relation known is the concept of cause and effect. This text will start out with the classical non-parametric statistics concepts. The concepts introduced in that section will be expanded on in the sections dealing with model based data.

In the first sections of the text I introduce the concepts used to do computations in statistics. Examples are probability density functions and expected values. Some of the more common probability density functions will be given and used in demonstrations. I hope I will do so with enough completeness that the reader can extend the methodology to other probability densities of interest. In the second section, I will use the concepts to estimate the results of real measurements of finite numbers of random numbers. Next, I will describe methods for dealing with time series. Following that, I describe various parameter estimation schemes that can be used to estimate parameters from typical science and engineering experiments like the heat transfer experiment mentioned above. Finally there is a section on random sampling of time series.