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Statistics as a discipline and in its routine practice relies on high-speed computation. Students of introductory statistics courses appreciate that computers are needed to implement the tests and other inferential procedures they encounter; these implementations often take the form of options in graphical user interfaces (GUIs). An introduction to a programming environment like R gives students the opportunity to experience first-hand some of the concepts that may have mystified them in the first course. A modest programming vocabulary enables students to carry out resampling, permutations, and bootstrapping, thus inviting them to experience concretely the meaning of such statistical concepts as sampling distributions, type-I error and power, and empirical densities. This paper is based on experience at a liberal arts college with a course offered to students having varied backgrounds and diverse expertise. Student teams took advantage of these backgrounds, and the course was largely built around team projects and, sometimes, open-ended investigations. The goals of the course and its projects shaped the computer programming component (in R) of the course. Students encountered challenges of “big data” problems, and they learned first-hand the meaning of reproducible research. (Received September 16, 2014)