**Simulation II**

Using Simulation to Estimate Probabilities

For the following problems estimate a probability by using Simulation in R. Use 100,000 replications.

1. Three men and two women sit in a row of chairs in random order. Use simulation to estimate the probability that men and women alternate. for(), sample(), which(), if().
2. Estimate the probability that all six faces appear exactly once in six tosses of a fair die. for(), sample(), length(), unique().
3. A waiting line consists of 40 men and 10 women arranged in random order. Use simulation to estimate the probability that no two women in line are adjacent to one another. for(), sample(), which(), diff().
4. You roll a fair die five times, estimate the probability that you will see a string of three or more ones. for(), sample(), sum.

Using Simulation in a Business Problem

A new edition of a very popular textbook will be published a year from now. The publisher estimates that demand for the book during the next year is governed by the probability distribution in Table 1 (see below). A production run incurs a fixed cost of $15,000 plus a variable cost of $20 per book printed. Books are sold for $190 per book. Up to 1000 of any leftover books can be sold to Barnes and Noble for $45 per book. The publisher is interested in printing 8,000 copies of the book. Use simulation with 100,000 replications to find the expected profit and standard deviation. The publisher can be 90% certain that the actual profit associated with remaining sales of the current edition will be between what two values?

Table 1: Probability Distribution

|  |  |
| --- | --- |
| Demand | Probability |
| 3000 | 0.20 |
| 4000 | 0.35 |
| 5000 | 0.25 |
| 6000 | 0.10 |
| 8000 | 0.05 |
| 10000 | 0.05 |