

Homework #2

ST 554

Blitzstein & Hwang: Chapter 2

3, 4, 6, 8, 10, 11, 28a, 34, 37, 54, 55

Extra problems: Chapter 2 (optional)

- solved: 1, 2, 22, 23, 25, 26, 30, 32, 35, 38, 39
- interest: 13, 26, 36, 59, 63

Computer Experiment: Conditional Independence (optional)

Consider tossing a fair die. Let $A = \{2, 4, 6\}$ and $B = \{1, 2, 3, 4\}$. Then $\Pr(A) = 1/2$, $\Pr(B) = 2/3$, and $\Pr(A, B) = 1/3$. Since $\Pr(A, B) = \Pr(A)\Pr(B)$, the events A and B are independent.

- Simulate draws from the sample space and denote $\hat{P}(A)$, $\hat{P}(B)$, and $\hat{P}(AB)$ as the proportion of time each event occurred in the simulation. Check if $\hat{P}(A, B) = \hat{P}(A)\hat{P}(B)$. Compare the simulated values to the theoretical values.
- Compute $\hat{P}(A|B) = \frac{\hat{P}(AB)}{\hat{P}(B)}$. Compare the simulated values to the theoretical values.
- Now repeat for another event C that is *not* independent of A and compute $\hat{P}(C)$, $\hat{P}(A, C)$, and $\hat{P}(A|C)$. Compare the simulated values to the theoretical values.