Stat 134: Section 2 Adam Lucas January 24, 2022

Conceptual Review

- a. True or false: "The conditional probability that *A* occurs given *B* occurs is at least the probability that *A* and *B* occur together."
- b. What is $P(A|\Omega)$?
- c. If *P* is a probability on Ω and *B* is an event in Ω (such that P(B) > 0), is $P(\cdot|B)$ a probability on Ω ?
- d. What is Bayes' Rule?
- e. Write the inclusion–exclusion rule for three events
 (i.e., *P*(*A* ∪ *B* ∪ *C*)). What happens if *A*, *B*, and *C* are mutually exclusive?

Problem 1

Events *A*, *B*, and *C* are defined in an outcome space. Find an expression for the probability that exactly two of *A*, *B*, *C* occur, *in terms of* P(AB), P(AC), P(BC), and P(ABC). (Recall the notation $AB = A \cap B$.)

Ex 1.3.10 *in Pitman's Probability*

It might be helpful to draw a Venn diagram.

Problem 2

A hat contains f + b coins, f of which are fair, b of which are biased to land heads with probability 2/3. A coin is drawn from the hat and tossed twice. The first time it lands heads, and the second time it lands tails. Given this information, what is the probability that it is a fair coin?

Ex 1.*rev*.11 *in Pitman's Probability*

It might be helpful to draw a tree diagram.

Problem 3

A box contains *n* tickets, labeled 1, 2, ..., n. Two tickets are drawn at random from the box. Find the chance that the numbers on the two tickets differ by two or more if the draws are made with replacement. *Ex* 1.rev.19 in Pitman's Probability