MAS 170 Elementary Statistics Spring 2022
Essential Clarifications to Freedman's Text
9 March 2022

Rounding in calculations

In general, do not round off any numbers in a multi-step calculation until the final step. If you must round, keep lots of digits. A rule of thumb is to round to the nearest 0.001, that is, to the nearest 3rd digit to the right of the decimal point.

Exceptions: When calculating a z value, you may round to the nearest 0.01, because that's the level of accuracy in the z column on the normal table. When calculating an area under the normal curve, you may usually round the final answer to the nearest whole percent.

"football-shaped" or "shaped like a football"
(p.120 and throughout Ch 8--12)

The text uses the term "football-shaped" very loosely to describe a scatter diagram that has linear association. Worse, the term "football-shaped" is sometimes used to imply homoscedasticity. Even worse, "football-shaped" seems to sometimes imply that both variables involved in the scatter diagram are normally distributed (see the box on p.197). Because of this vagueness and ambiguity, we will instead use the terms "shows linear association", "homoscedastic", and "normally distributed" for these various attributes that may or may not apply to 2-variable data. In particular, in the box on p.197, and also in item 7 of the Ch 11 summary on p.201, replace the first sentence with "Suppose that a scatter diagram shows linear association, is homoscedastic, and that both variables are distributed normally."

outcome, event, and "thing"

In a box model, an ***outcome*** is a sequence of tickets obtained by random draws, either with or without replacement. For example, here are the 27 possible outcomes for 3 draws, with replacement, from the box {a,b,c}.

aaa, aab, aac, aba, abb, abc, aca, acb, acc
baa, bab, bac, bba, bbb, bbc, bca, bcb, bcc
caa, cab, cac, cba, cbb, cbc, cca, ccb, ccc

We say that the probability of each of these outcomes is 1/27, because this is a complete list of the 27 equally likely possible outcomes for the 3 draws.

An ***event*** is a collection of outcomes. For example, the events "get 1 b" and "get 2 a's" in the example above are

"get 1 b" = aab, aba, abc, acb, baa, bca, bac, bcc, cab, cba, cbc, ccb
"get 2 a's" = aab, aac, aba, aca, baa, caa

We will use the correct terms "outcome" and "event" instead of the vague term "thing" used in the text in Ch 13. In particular, replace the box on p.230 with the following: "Two events A,B are *independent* if $P(B|A) = P(B)$. Otherwise, the events A,B are *dependent*."

probability symbols

We will write P(a) or P(A) to denote the probability for an outcome a or an event A. For example, in the game of 3 draws, with replacement, from the box {a,b,c}, the probability of the single outcome acb is

P(acb) = 1/27 = approx 3.7%.

The probability of getting 1 b in 3 draws is

P(get 1 b) = 12/27 = approx 44.4%

because there are 12 equally likely outcomes in the event "get 1 b" and there are 27 equally likely outcomes in all for the 3 draws. The probability of getting 2 a's is

P(get 2 a's) = 6/27 = approx 22.2%

because there are 6 equally likely outcomes in the event "get 2 a's".

We will write P(A|B) to denote the probability of event A given that event B has happened. For example, in 3 draws with replacement from the box {a,b,c}, we have

P(get 2 a's | get 1 b) = 3/12 = 25%

because there are 3 outcomes, namely aab, aba, baa, that have 2 a's, among the 12 outcomes that have 1 b. We also have

P(get 1 b | get 2 a's) = 3/6 = 50%

because there are 3 outcomes, namely aab, aba, baa, that have 1 b, among the 6 outcomes that have 2 a's.