

### **Rounding in calculations**

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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)

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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"**

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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 12 possible outcomes for 2 draws, without replacement, from the box {A,K,Q,J}. (This is a box model for "two cards are dealt from a 4-card deck containing an ace, a king, a queen, and a jack".)

AK, AQ, AJ, KA, KQ, KJ, QA, QK, QJ, JA, JK, JQ

In this notation, "AK" means the ace is drawn first, and the king second, while "KA" means the king is first and the ace is second.

An **event** is a collection of outcomes. For example, the events "get a Q" and "get K on the first draw" in the example above are

"get a Q" = QA, QK, QJ, AQ, KQ, JQ  
"get K on draw 1" = KA, KQ, KJ

Another example is the event "get the hand A-K". In a "hand", it does not matter what order the cards are dealt in, so we have

"get the hand A-K" = AK, KA

We will use the correct terms "outcome" and "event" instead of the vague term "thing" used in the text in Ch 13.

### **probability symbols**

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We will write  $P(E)$  to denote the probability for an event  $E$ . For example, in the game of 2 draws, with replacement, from the box {A,K,Q,J}, the probability of the single outcome AJ is

$$P(AJ) = 1/12 = \text{approx } 8.3\%$$

because there are 12 equally likely outcomes for the 2 draws. The probability for getting the hand A-K is

$$P(\text{get the hand A-K}) = 2/12 = \text{approx } 16.7\%$$

because there are 2 equally likely outcomes in the event "get the hand A-K", and there are 12 equally likely outcomes in all for the 2 draws. The probability of getting a Q is

$$P(\text{get a Q}) = 6/12 = 50\%$$

because there are 6 equally likely outcomes in the event "get a Q". The probability of getting K on the first draw is

$$P(\text{get K on draw 1}) = 3/12 = 25\%$$

because there are 3 equally likely outcomes in the event "get K on draw 1".

We will write  $P(E|F)$  to denote the probability that event E happens given that event F has happened. For example, in 23 draws with replacement from the box {A,K,Q,J}, we have

$$P(\text{get a Q} \mid \text{get K on draw 1}) = 1/3 = \text{approx } 33.3\%$$

because there is 1 outcome, namely KQ, that has a Q, among the 3 outcomes that have K on draw 1. We also have

$$P(\text{get K on draw 1} \mid \text{get a Q}) = 1/6 = \text{approx } 16.7\%$$

because there is 1 outcome, namely KQ, for which draw 1 is a K, among the 6 outcomes that have a Q.

The definitions of independent and dependent events (box on p.230) should be replaced by the following: "Two events E,F are *independent* if  $P(F|E) = P(F)$ . Otherwise, the events E,F are *dependent*." Or in words, "Two events E,F are *independent* if the probability of F given that E has happened is equal to the probability of F. Otherwise, the events E,F are *dependent*."