

17.14. First of all, because this probability is so small, being dealt four-of-a-kind is highly unlikely on any one hand. We can interpret the probability 0.00024 as a “long-run proportion.” That is,

“Over the course of being dealt many poker hands, the proportion of hands containing four-of-a-kind would be 0.00024. This is 2.4 hands out of every 10,000 hands dealt.”

17.15. (a) If an event can never occur, then it has probability 0.

(b) If an event is certain to occur, then it has probability 1.

(c) A probability of 0.01 is consistent with “the event is very unlikely, but it will occur once in a while in a long sequence of trials.”

(d) A probability of 0.6 is consistent with “the event will occur more often than not.” Technically 0.99 is too, but this would mean “the event happens on nearly every trial.”

17.17. A probability of 0.3 means that 30% of the population of drivers will be involved in an accident next year. This population is very large and includes all types of drivers, including those who are very safe drivers, those who are risky drivers, old drivers, and young drivers who are just learning how to drive.

(a) I would say 0.10 is my personal probability.

(b) I am a safe driver, and I have no physical limitations that would prohibit me from driving safely. I believe if I were to have an accident it would likely be someone else’s fault.

(c) Probably because no one *wants* to be in an accident. There are also a lot of drivers who *think* they are safe drivers when, in fact, they aren’t. They are underestimating their own risk. This commonly occurs with younger drivers.

17.22. (a) If the lottery numbers are chosen at random, then each four digit number (0000, 0001, 0002, ..., 9999) has the same chance of occurring:

$$\left(\frac{1}{10}\right)^4 = \frac{1}{10000}.$$

(b) To most people, the number “9999” doesn’t seem random because it contains the same digits. However, this number has the same chance of being selected as any other 4-digit number.

- On the other hand, “2873” *looks* more random than “9999,” so more people if given the choice would prefer to take this number (thinking that winning lottery numbers are random). In reality, “2873” and “9999” have the same chance of being selected.
- If your number is selected (again, only a 1/10000 chance, so highly unlikely), then obviously you would want few other winners so you get a larger share of the total jackpot.
- This would suggest you should pick a number like “9999” if you decide to play this lottery. It is just as likely as any other 4-digit number, and fewer people might be inclined to select it. This would give you a larger share of the jackpot if you win.

17.28. It's funny that the meteorologist admits s/he isn't supposed to use the law of averages but does so anyway. We can think about this as the same question of flipping coins where "the past few" flips have been heads. This doesn't mean the next flip is more likely to be "tails." The same logic applies here:

- Comparing what happens this winter to "the past few winters" is short-term thinking; not long-term.
- If each winter's weather is independent of previous winters, the probability of "below-average snowfall" this year is the same as it is in any other year.
- The fact that "the past few winters" have had above-average snowfall isn't relevant to what happens this year.