answer on the probability of *exactly* 501 heads, which is the small value of 0.0252. In this situation, any specific number of heads will have a very low probability.) Based on the 0.487 probability of getting 501 heads or more, we conclude that 501 heads in 1000 tosses of a fair coin is not an unusually high number of heads. (See Example 11 in Section 4-2.)

Example 7 Identifying Unusual Results with Probabilities

The Chapter Problem includes results consisting of 879 girls in 945 births. Is 879 girls in 945 births an unusually high number of girls? What does it suggest about the effectiveness of the XSORT method of gender selection?

Solution

The result of 879 girls in 945 births is more than we expect under normal circumstances, so we want to determine whether 879 girls is *unusually high*. Here, the relevant probability is the probability of getting *879 or more* girls in 945 births. Using methods covered later in Section 5-3, we can find that P(879 or more girls in 945 births) $=$ 0.000 when rounded to three decimal places. (We can denote such a probability as 0+.) Because the probability of getting 879 or more girls is less than or equal to 0.05, we conclude that 879 girls in 945 births is an unusually high number of girls.

Interpretation

Because it is so unlikely that we would get 879 or more girls in 945 births by chance, these results suggest that the XSORT method of gender selection is effective in increasing the likelihood that a baby will be a girl. (However, this does not *prove* that the XSORT method is responsible for the large number of girls.)

Part 2: Expected Value in Decision Theory and Rationale for Formulas 5-1 through 5-4

Expected Value in Decision Theory

In Part 1 of this section we noted that the expected value of a random variable x is equal to the mean μ. We can therefore find the expected value by computing $\Sigma[x \cdot P(x)]$, just as we do for finding the value of μ. We also noted that the concept of expected value is used in *decision theory*. In Example 8 we illustrate this use of expected value with a situation in which we must choose between two different bets. Example 8 involves a real and practical decision.

Example 8 Be a Better Bettor

You have \$5 to place on a bet in the Golden Nugget casino in Las Vegas. You have narrowed your choice to one of two bets:

Roulette: Bet on the number 7 in roulette.

Craps: Bet on the "pass line" in the dice game of craps.