Example 3 illustrates well the power and ease of using technology. Example 3 also illustrates the rare event rule of statistical thinking: If under a given assumption (such as the assumption that the XSORT method has no effect), the probability of a particular observed event (such as 879 girls in 945 births) is extremely small (such as 0.05 or less), we conclude that the assumption is probably not correct.

Method 3: Using Table A-1 in Appendix A Table A-1 in Appendix A lists binomial probabilities for select values of n and p. It cannot be used for Example 2 because the probability of $p = 0.85$ is not one of the probabilities included. Example 3 illustrates the use of the table.

To use the table of binomial probabilities, we must first locate n and the desired corresponding value of x. At this stage, one row of numbers should be isolated. Now align that row with the desired probability of p by using the column across the top. The isolated number represents the desired probability. A very small probability, such as 0.000064, is indicated by 0+.

Example 4 Devil of a Problem

Based on a recent Harris poll, 60% of adults believe in the devil. Assuming that we randomly select five adults, use Table A-1 to find the following:

a. The probability that exactly three of the five adults believe in the devil

b. The probability that the number of adults who believe in the devil is at least two

Solution

a. The following excerpt from the table shows that when $n = 5$ and $p = 0.6$, the probability for $x = 3$ is given by $P(3) = 0.346$.

TABLE A-1 Binomial Probabilities

				p	
n	*x*	.01	.50	.60	.70
5	0	.951	.031	.010	.002
	1	.048	.156	.077	.028
	2	.001	.312	.230	.132
	3	0+	.312	.346	.309
	4	0+	.156	.259	.360
	5	0+	.031	.078	.168

x	*P(x)*
0	0.010
1	0.077
2	0.230
3	0.346
4	0.259
5	0.078

b. The phrase "at least two" successes means that the number of successes is 2 or 3 or 4 or 5.

$$\begin{aligned} P(\text{at least 2 believe in the devil}) &= P(2 \text{ or } 3 \text{ or } 4 \text{ or } 5) \\ &= P(2) + P(3) + P(4) + P(5) \\ &= 0.230 + 0.346 + 0.259 + 0.078 \\ &= 0.913 \end{aligned}$$

If we wanted to use the binomial probability formula to find $P(\text{at least 2})$, as in part (b) of Example 3, we would need to apply the formula four times to compute four different probabilities, which would then be added. Given this choice between