Although a media report about this study used "90%," the more precise percentage of 90.0778% is obtained by using the actual number of respondents who said that appearance of a job applicant is most important for a good first impression ($x = 463$) and the sample size ($n = 514$). When conducting the hypothesis test, better results can be obtained by using the sample proportion of 0.900778 (instead of 0.90).

Example 3 Did the County Clerk Cheat?

The Chapter Problem includes data showing that when the county clerk in Essex County, New Jersey, selected candidates for positions on election ballots, Democrats were selected first in 40 of 41 ballots. Because he was supposed to use a method of random selection, Republicans claimed that instead of using randomness, he used a method that favored Democrats. Use a 0.05 significance level to test the claim that the method favored Democrats.

Solution

Requirement check (1) For the purpose of conducting the hypothesis test, we assume that the county clerk used a process of random selection. (2) There is a fixed number (41) of independent trials with two categories (the Democrat won the top line on the ballot or did not). (3) The requirements $np \geq 5$ and $nq \geq 5$ are both satisfied with $n = 41$ and $p = 0.5$. (We get $np = (41)(0.5) = 20.5$, which is greater than or equal to 5, and we also get $nq = (41)(0.5) = 20.5$, which is greater than or equal to 5.) The three requirements are all satisfied. ✔

If using technology, the test statistic and the *P*-value will be provided. See the accompanying results from StatCrunch showing that the test statistic is $z = 6.09$ (rounded) and the indication that the *P*-value is less than 0.0001. The low *P*-value suggests that we reject the null hypothesis and support the alternative hypothesis that $p > 0.5$, so it appears that the county clerk did use a procedure that favored Democrats for the top position on the election ballots.

STATCRUNCH

Hypothesis test results:

p : proportion of successes for population

H_0 : p = 0.5

H_A : p > 0.5

Proportion	Count	Total	Sample Prop.	Std. Err.	Z-Stat	P-value
p	40	41	0.9756098	0.07808688	6.090777	<0.0001

If technology is not available, proceed as follows to conduct the hypothesis test using the *P*-value method summarized in Figure 8-1 from Section 8-2.

Step 1: The original claim is that the clerk used a method that favored Democrats. We express this in symbolic form as $p > 0.5$.

Step 2: The opposite of the original claim is $p \leq 0.5$.

Step 3: Because $p > 0.5$ does not contain equality, it becomes H_1. We get

H_0: $p = 0.50$ (null hypothesis)

H_1: $p > 0.50$ (alternative hypothesis and original claim)

Step 4: The significance level is $\alpha = 0.05$.