

6. Investing in College Based on a *USA Today* poll, assume that 10% of the population believes that college is no longer a good investment.

- Find the probability that among 16 randomly selected people, exactly 4 believe that college is no longer a good investment.
- Find the probability that among 16 randomly selected people, at least 1 believes that college is no longer a good investment.
- The poll results were obtained by Internet users logged on to the *USA Today* web site, and the Internet users decided whether to ignore the posted survey or respond. What type of sample is this? What does it suggest about the validity of the results?

Technology Project

Overbooking Flights American Airlines Flight 201 from New York's JFK airport to LAX airport in Los Angeles uses a Boeing 767-200 with 168 seats available for passengers. Because some people with reservations don't show up, American can overbook by accepting more than 168 reservations. If the flight is not overbooked, the airline will lose revenue due to empty seats, but if too many seats are sold and some passengers are denied seats, the airline loses money from the compensation that must be given to the bumped passengers. Assume that there is a 0.0995 probability that a passenger with a reservation will not show up for the flight (based on data from the IBM research paper "Passenger-Based Predictive Modeling of Airline No-Show Rates," by Lawrence, Hong, and Cherrier). Also assume that the airline accepts 182 reservations for the 168 seats that are available.

Find the probability that when 182 reservations are accepted for American Airlines Flight 201, there are more passengers showing up than there are seats available. Table A-1 (the Binomial Probabilities table) cannot be used and calculations with the binomial probability formula would be extremely time-consuming and tedious. The best approach is to use statistics software or a TI-83/84 Plus calculator. (See Section 5-3 for instructions describing the use of STATDISK, Minitab, Excel, StatCrunch, or a TI-83/84 Plus calculator.) Is the probability of overbooking small enough so that it does not happen very often, or does it seem too high so that changes must be made to make it lower? Now use trial and error to find the maximum number of reservations that could be accepted so that the probability of having more passengers than seats is 0.05 or less.

from data TO DECISION

Critical Thinking: Did Mendel's results from plant hybridization experiments contradict his theory?

Gregor Mendel conducted original experiments to study the genetic traits of pea plants. In 1865 he wrote "Experiments in Plant Hybridization," which was published in *Proceedings of the Natural History Society*. Mendel presented a theory that when there are two inheritable traits, one of them will be dominant and the other will be recessive. Each parent contributes one gene to an offspring and, depending on the

combination of genes, that offspring could inherit the dominant trait or the recessive trait. Mendel conducted an experiment using pea plants. The pods of pea plants can be green or yellow. When one pea carrying a dominant green gene and a recessive yellow gene is crossed with another pea carrying the same green/yellow genes, the offspring can inherit any one of these four combinations of genes: (1) green/green; (2) green/yellow; (3) yellow/green; (4) yellow/yellow. Because green is dominant and yellow is recessive, the

offspring pod will be green if either of the two inherited genes is green. The offspring can have a yellow pod only if it inherits the yellow gene from each of the two parents. Given these conditions, we expect that $3/4$ of the offspring peas should have green pods; that is, $P(\text{green pod}) = 3/4$.

When Mendel conducted his famous hybridization experiments using parent pea plants with the green/yellow combination of genes, he obtained 580 offspring. According to Mendel's theory, $3/4$ of the offspring should have