

A42 and, while holding down the mouse button, drag it to the right until reaching column DV. Row 42 will show the numbers of times a Democrat was selected in 41 ballots. Scroll across row 42 and see how often you get 40 Democrats or 41 Democrats when using a process of random selection.

**TI-83/84 Plus:** Press **MATH**, then select **PRB** and select the menu item of **randBin**. Make the entries to get **randBin(41, 0.5, 100)**. That command causes 100 simulations of the process of randomly selecting Democrats in each of 41 election ballots. Store the results in list L1 by pressing **STO>** L1. Press **ENTER**. Now press **STAT** and select **Edit**, then scroll through list L1 to see how often you get 40 Democrats or 41 Democrats when using a process of random selection.

**StatCrunch:** Click on **Data**, then click on **Simulate Data**, then select the menu item of **Binomial**. In the dialog box, enter 100 for the number of rows, enter 1 for the number of columns, enter 41 for  $n$ , and enter 0.5 for  $p$ . Click on **Simulate**. Scroll through the list of results and count the number of times that you got 40 Democrats or 41 Democrats using a process of random selection.

## from data TO DECISION

### Critical Thinking:

#### Designing an aircraft cockpit

In designing a cockpit for a Boeing aircraft, the overhead grip reach of a seated pilot is being considered as an important factor for placement of landing light switches to be located directly above the pilot. Listed below are the measured overhead grip reaches (cm) of a simple random sample of

women (based on anthropometric data from Gordon, Churchill, et al.). Use a 0.01 significance level to test the claim that the mean overhead grip reach of women is less than the value of 123 cm that is being planned for an aircraft.

120	115	130	123	118	118	116
121	119	131	125	119	124	122
121	129	125	126	115	122	

### Analyzing the Results

**a.** It is not too difficult to conduct the hypothesis test, but is that hypothesis test the best tool for determining whether the value of 123 cm is suitable? If not, determine whether 123 cm is suitable, and if it is not suitable, find a value that is suitable.

**b.** In this application, why does it make sense to ignore the overhead grip reach of men?

## Cooperative Group Activities

**1. In-class activity** Without using any measuring device, each student should draw a line believed to be 3 in. long and another line believed to be 3 cm long. Then use rulers to measure and record the lengths of the lines drawn. Find the means and standard deviations of the two sets of lengths. Test the claim that the lines estimated to be 3 in. have a mean length that is equal to 3 in. Test the claim that the lines estimated to be 3 cm have a mean length that is equal to 3 cm. Compare the results. Do the estimates of the 3-in. line appear to be more accurate than those for the 3-cm line? Do an Internet search to identify the countries that do not yet use the metric system. What do these results suggest?

**2. In-class activity** Assume that a method of gender selection can affect the probability of a baby being a girl so that the probability becomes  $1/4$ . Each student should simulate 20 births by drawing 20 cards from a shuffled deck. Replace each card after it has been drawn, then reshuffle. Consider the hearts to be girls and consider all other cards to be boys. After making 20 selections and recording the “genders” of the babies, use a 0.10 significance level to test the claim that the proportion of girls is equal to  $1/4$ . How many students are expected to get results leading to the wrong conclusion that the proportion is not  $1/4$ ? How does that relate to the probability of a type I error? Does this procedure appear to be effective in identifying