

**Excel:** Click on cell A1 (in the upper left corner), then click on the function icon **fx**. Select **Math & Trig**, then select **RANDBETWEEN**. In the dialog box, enter 1 for “bottom,” and enter 365 for “top.” After getting the random number in the first cell, click and hold down the mouse button to drag the lower right corner of this first cell, and pull it down the column until 25 cells are highlighted. When you release the mouse button, all 25 random numbers should be present.

**TI-83/84 Plus:** Press **MATH**, select **PRB**, then choose **randInt**. Enter the minimum of 1, the maximum of 365, and 25 for the number of values, all separated by commas, as in **randInt(1, 365, 25)**. Press **ENTER**. You can store the results in list L1, then you can sort list L1 by pressing **STAT** and selecting **SortA** (sort in ascending order).

**StatCrunch:** Click on **Open StatCrunch**, then click on **Data** and select the menu item of **Simulate data**. Among the options available, select **Discrete Uniform**. In the dialog box that appears, enter 25 for the number of rows and enter 20 for the number of columns (as required for the following simulation). Enter 1 for the minimum and enter 365 for the maximum, then click on **Simulate**. You can sort columns by clicking on **Data**, then selecting the menu item of **Sort columns**. The sorted columns will appear to the right of the original columns.

### Applying Simulation Methods

1. Use the above simulation method to randomly generate 20 different groups of 25 birthdays. Use the results to estimate the probability that among 25 randomly selected people, at least 2 have the same birthday.
2. One of the author's favorite class activities is to give this assignment: All students take out a coin and flip it. Students getting heads go home and actually flip a coin 200 times and record the results. Students getting tails make up their own results for 200 coin flips. In the next class, the author could select any student's results and quickly determine whether the results are real or fabricated by using this criterion: If there is a run of six heads or six tails, the results are real, but if there is no such run, the results are fabricated. This is based on the principle that when fabricating results, people almost never include a run of six or more heads or tails, but with 200 actual coin flips, there is a very high probability of getting such a run of at least six heads or tails. The calculation for the probability of getting a run of at least six heads or six tails is *extremely* difficult. Fortunately, simulations can let us know whether such runs are likely in 200 coin flips. Simulate 200 actual coin flips, repeat the simulation 20 times, then estimate the probability of getting a run of at least six heads or six tails when 200 coins are tossed. *Caution:* Do not sort generated numbers, because the probability should be based on the original sequence of coin tosses.