Technology Project

Simulation for the Chapter Problem The Chapter Problem describes a situation in which a county clerk was supposed to use a method of random selection for determining whether the Democrat or Republican would get the top line on each of 41 different election ballots. His procedure resulted in the Democrat being selected 40 times in the 41 trials. Section 8-3 discussed the formal hypothesis test of his claim that he used a random method. This project involves a different approach consisting of simulations. The basic idea is to assume that randomness is used with a 0.5 probability of selecting a Democrat, then making the random selection 41 times. After repeating that simulation 100 times, we will see how often the results are as extreme as 40 or 41 Democrats selected in the 41 trials. We will then understand how unlikely it is to get 40 Democrats in 41 trials. The simulation is basically the same as repeatedly tossing 41 coins and seeing how often the result is 40 heads or 41 heads.

Use STATDISK, Minitab, Excel, StatCrunch, the TI-83/84 Plus calculator, or any other technology that can randomly generate data from a binomial distribution. Conduct 100 simulations of the process of randomly selecting a Democrat or Republican for the top line on each of 41 different election ballots. Examine the results and write a brief statement explaining how they either support or refute the claim that the county clerk did not really use a method of random selection.

Here are instructions for different technologies.

STATDISK: Click on **Data,** then click on **Binomial Generator.** In the dialog box, enter 100 for the sample size (because we want to repeat the selection process 100 times), enter 0.5 for the success probability (so that there is a 0.5 probability of selecting a Democrat), and enter 41 for the number of trials (to simulate the 41 election ballots). Click on **Generate.** Scroll through the results and count the number of times that you got 40 Democrats or 41 Democrats using a process of random selection.

Minitab: Click on the main menu item of **Calc,** then click on **Random Data,** then **Binomial.** In the dialog box, enter 100 for the sample size (because we want to repeat the selection process 100 times), enter C1 as the column to store the results, enter 41 for the number of trials (to simulate 41 election ballots), and enter 0.5 for the event probability (so that there is a 0.5 probability of selecting a Democrat). Click on **OK.** 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.

Excel: Click on *fx* just below the tool bar. Select the category of **Math & Trig,** then select **RANDBETWEEN.** Click on **OK.** Proceed to enter 0 for "bottom" and enter 1 for "top." Click on **OK.** Excel will randomly select either 0 or 1 and the result will appear in cell A1. Click on the lower right corner of cell A1 and, while holding the mouse button down, drag the mouse downward until 41 rows are highlighted. When the mouse button is released, column A should include 41 values, each of which is 0 or 1. Now click on cell A41 and, while holding the mouse button down, drag the mouse to the right until reaching column DV, so that 100 columns are highlighted. When the mouse is released, you will have 100 columns of simulated election ballots. In cell A42, enter the expression **=SUM(A1:A41)** so that the sum of the entries in column A will be shown. This is the number of times a Democrate was selected in 41 trials. Click on the lower right corner of cell