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Math 171 Political Party Project Part II
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November 17th, 2017

Kirsten calculated the simple random sample that was used in the project with the TI-Nspire CX calculator. The first step was to number all of the students from 1 to 460. The next step was to click on “menu”, then on to “probability”, then to “random” and then “seed”. This caused “RandSeed” to appear on the screen. The next step was to enter a random three digit number in order to produce a more randomized sample, in this case the number 365 was selected. The next step was to hit “probability”, and then “random” and “selected integer”. This caused “randInt” to appear on the screen. The next step is to enter the minimum, maximum, and number of desired samples and it formatted to “randInt(1, 460, 30)”. After pressing “enter”, 30 random numbers were generated. Out of those numbers only two repeated, so it had to be replaced by entering “randInt(1,460,2)” into the calculator in order to get two new random numbers. This was the best way to collect a simple random sample because no bias was controlling which numbers were picked. Charlotte has the TI-84 Plus calculator. If that calculator was going to be used to calculate the simple random sample, the first step would be to randomize the calculator. To randomize the calculator, the first step is to enter any three digit number and press the “sto” button. An arrow should appear on the screen. Next, press “math”, then scroll left to “probability”, then scroll down to “rand”. Then, hit “enter”. The calculator will then be randomized. The next step would be to number all of the students 1 to 460 from the project data. The next step would be to hit “math”, click to the right to “probability”, scroll down to “random integer” and enter the minimum, maximum, and sample size. It would have read (1, 460, 30). After this step, a simple random sample will be generated.

We chose a 1 Proportion Z Test to test the claim that 55% of Millennials in 2016 identify as Democrats or lean Democratically because it provides us with one proportion to test and it is asking for evidence to support or reject the claim that it has or has not changed. To begin the 1 Proportion Z Test, the parameters need to be defined. The parameter is the proportion of all Millennials that identify as Democrats or leaned Democratic. Next, the null and alternative hypotheses need to be defined. The null hypothesis would be: $p = .55$. The alternative hypothesis would be $p \neq .55$. The third step would be to state the test as a 1 Proportion Z Test. The sample size needs to be stated as $n = 30$. The predicted successes and failures were then calculated by multiplying P_0 by n and $n(1-P_0)$. This gave us values of 16.5 and 13.5 respectively. This means that we can proceed without test because the predicted successes and failures are greater than or equal to 10. For our sample, the successes = 9, and the failures = 21. Alpha is defined as 0.10 because alpha is not given and it allows for the greatest amount of chance to be correct. The fourth step is to enter the statistics into the calculator. For the Ti-Nspire CX, the first step is to select “Statistics” under the menu. Then, go to “Stats Tests” and find “1-Prop z test”. Then P_0 was entered as $.55$, x as 9, and n as 30. For “Alternative Hyp”, “ H_a : prop $\neq P_0$ ” was entered. For the Ti-84 Plus, the first step is to click “stat”, then click twice to the right to “tests”, then scroll down to “1-PropZTest”, and enter P_0 as $.55$, x as 9, and n as 30. For “prop”, select $\neq P_0$ because that means it will test the alternative hypothesis. By hitting enter, the calculator reads that

$z = -2.7524$ and $P = 0.00592$. Finally, the conclusion statement would be that there is significant evidence at the (0.01 level) that the proportion of all Millennials that identify as a Democrat or leaning Democratic is different than 0.55.

This sample can be used to test the claim for all Longwood statistics students. This is because the sample was taken from all Math 171 and Math 301 classes. This means the sample is representative of all Statistics students at Longwood. Also, it was a simple random sample so there is no bias present in the data collection.

For the confidence interval, we first determined that it would be a 2-proportion Z interval because two different, independent populations were being compared using proportions. Then, we listed our two parameters, one for each population being compared. Our first parameter, P_1 , was the proportion of all male students who consider themselves Republicans. Our second parameter, P_2 , was the proportion of all female students who consider themselves Republicans. Next we listed our conditions. We stated that we were conducting a 2-proportion Z interval, that we were using a simple random sample, and that there was no relationship between the two populations being compared. Next, we calculated the total successes and failures for both samples. A success was defined as any individual who considered him/herself Republican while a fail was any individual who considered him/herself a member of any other party. There were a total of 6 males who identified as republicans and a total of 3 who did not. There were a total of 9 females who identified as republican and a total of 12 who did not. The fact that the sample sizes are different doesn't matter; however each sample size, n , should equal at least 10. This being said, there were only 9 males in the male sample group. With this noted, we proceeded with our calculations anyway. Given that each success and fail group should be of at least size 5 and the failures for the males is 3, we utilized the "plus 1 rule" and added 1 to each success and failure category. This changed our successes to 7 for men and 10 for women and our failures to 4 for men and 13 for women. This added two to each of our sample sizes making them 11 for the men and 23 for the women; this also fixed our issue with the n for males being less than 10.

Kirsten then went under menu in her calculator to statistics then confidence intervals and selected "2-prop Z interval". She then entered the successes, population sizes, and 0.95 confidence interval. Charlotte used the Ti-84 Plus. She pressed "stat", clicked "tests", then clicked down to "2-PropZInt", and then enter the successes, population sizes, and the 0.95 confidence interval.

This gave us a confidence interval of $-0.1475 < P_1 - P_2 < 0.5507$. Our $\hat{p}_1 = 0.6364$ and our $\hat{p}_2 = 0.4348$. This tells us that we are 95% confident that the difference between the proportion of all men who consider themselves Republican and the proportion of all women who consider themselves Republican is between -0.1475 and 0.5507. In other words, this means we are 95% confident that the percent of all women who consider themselves Republican is between 14.75% higher and 55.07% lower than the percent of all men who consider themselves Republican.

Our confidence interval implies that men are more likely to vote Republican than women. This is because the percent of women who consider themselves Republican has a lower bound of

only 14.75% greater than the percent of men who consider themselves Republican while the upper bound states that the percent of women who consider themselves Republican is 55.07% lower than the percent of men who consider themselves Republican. This suggests that men have a higher likelihood of being Republican and, therefore, a higher likelihood of voting Republican.

Appendix

| Number | Number/460 | Sex | Class | Political Party |
|--------|------------|--------|-----------|-----------------|
| 1 | 10 | female | junior | Republican |
| 2 | 49 | female | freshman | Other |
| 3 | 60 | female | sophomore | Republican |
| 4 | 66 | female | freshman | Other |
| 5 | 77 | female | freshman | Other |
| 6 | 78 | female | freshman | Libertarian |
| 7 | 103 | female | freshman | Democrat |
| 8 | 118 | female | freshman | Other |
| 9 | 124 | female | freshman | Republican |
| 10 | 137 | female | sophomore | Democrat |
| 11 | 149 | female | freshman | Green |
| 12 | 153 | female | sophomore | Democrat |
| 13 | 171 | female | freshman | Republican |
| 14 | 177 | female | junior | Republican |
| 15 | 186 | female | freshman | Republican |
| 16 | 200 | male | freshman | Republican |
| 17 | 212 | female | freshman | Democrat |
| 18 | 222 | female | senior | Republican |
| 19 | 275 | female | senior | Republican |
| 20 | 296 | female | freshman | Democrat |
| 21 | 298 | female | freshman | Republican |
| 22 | 304 | female | junior | Democrat |
| 23 | 315 | male | sophomore | Republican |

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|----|-----|------|-----------|------------|
| 24 | 330 | male | sophomore | Republican |
| 25 | 331 | male | senior | Republican |
| 26 | 347 | male | junior | Democrat |
| 27 | 356 | male | junior | Republican |
| 28 | 383 | male | junior | Republican |
| 29 | 395 | male | junior | Democrat |
| 30 | 432 | male | junior | Democrat |