The lesson documents provide information about using the calculator provided with the lessons. The purpose of this supplement is to supply information about another possible technology, namely the TI-83/84 series calculator.

CAUTION: You should note that the interface for the calculator has changed in the past and may well change in the future – accordingly, some of the information given here may prove to be out of date.

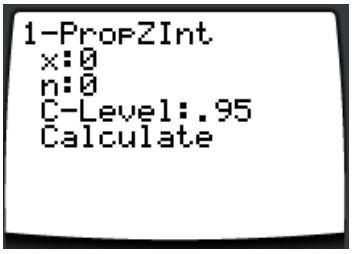
Lesson 9

Confidence intervals

All the options for doing confidence interval and hypothesis tests are contained in the calculator's STAT TESTS menu. To reach this menu, you press STAT then scroll right to TESTS, as shown here:

As you can see, the first 6 options have the word "Test," indicating that they relate to hypothesis tests of various types. We should scroll down so we can see the options containing the word "Interval" or its abbreviation "Int"; these are for various types of confidence intervals.

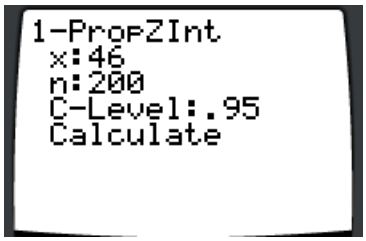
Option ***A: 1-PropZInt*** is the option we want. The "Prop" in this option stands for proportion, the "Z" for the fact that a *z** score is used to calculate the margin of error, and the "1–" indicates that we want to estimate a single proportion based on a single sample. Once we choose this option, we get the following screen:



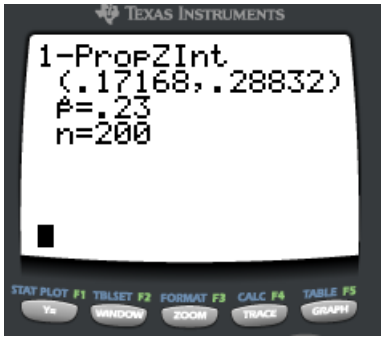
To complete the process, we:

- Enter the number of "successes" x and hit the down arrow.
- Enter the sample size n, and hit down arrow.
- Enter the confidence level and hit down arrow to highlight the "Calculate"
- Press ENTER.

Example: Suppose that in a random sample of 200 people in a certain district, 46 said that they would vote for a particular candidate in an upcoming election. Find a 95% confidence interval to estimate the population proportion of all people in this district that would vote for this candidate. In this problem x=46, n=200, and the confidence level is 0.95.



Using the above instructions, you should get the following:

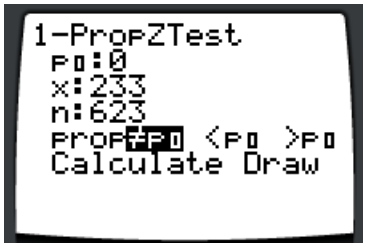


The 95% confidence interval is (.17168,.28832). This means that we are 95% confident that between 17.17% and 28.83% of people in this district would vote for this candidate. The calculator also shows the $\hat{p}$ value, 23%.

Hypothesis tests

All the options for doing confidence interval and hypothesis tests are contained in the calculator's STAT TESTS menu. To reach this menu, you press STAT then scroll right to TESTS, as shown here:

As you can see, the first 6 options have the word "Test," indicating that they relate to hypothesis tests of various types. Option ***5: 1-PropZTest*** is the option we want. The "Prop" in this option stands for proportion, the "Z" for the fact that a *z* score is used to calculate the *p*-value, and the "1–" indicates that we are examining a single proportion based on a single sample. Once we choose this option, we get the following screen:



Note: The screen above has an *x* value and an *n* value left over from the last proportion-related work that was done by the person using the calculator. Your screen will probably have different values. In any case, you will likely have to change them to solve your new problem you are working on.

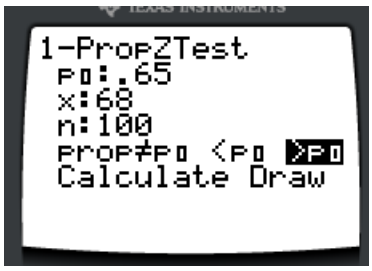
To complete the process:

- Enter the value of p_0 from the null hypothesis
- Enter the number of successes *x*
- Enter the sample size *n*
- Choose whether you want a two-sided or a particular one-sided alternative. As shown above, the person has "$prop \neq p_0$" highlighted, that is a two-sided test. You can change the highlighting to choose "$< p_0$" (that is, "$prop < p_0$") or "$> p_0$" (that is, "$prop > p_0$") instead.
- Scroll down to "Calculate" and press ENTER.

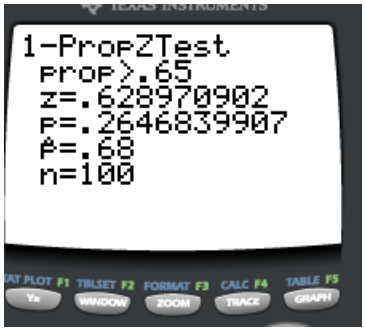
Example: Test the following claim, assuming that 68 of the 100 people surveyed answered "yes" when asked the question. Is this enough evidence to refute the null hypothesis?

$H_0: p = 0.65$
$H_a: p > 0.65$

In this problem, $p_0 = 0.65$, $n = 100$ and $x = 68$. We want a one-tail test, since the alternative hypothesis has the form "$p > p_0$". We enter the data as shown below:



The following screenshot shows the findings:



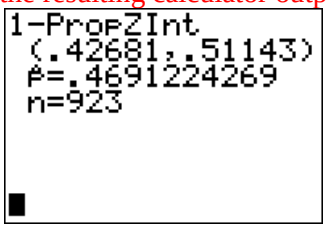
Therefore the *z*-test statistic value (rounded to four places) is 0.6290 and the *p*-value is 0.2646. Since the *p*-value is not small we do not reject the null hypothesis.

Solutions to exercises that use the calculator.

Exercise 1:

a. Use the calculator to calculate a 99% confidence interval if 433 persons in a random sample of size 923 answered "yes" to the question posed.

Here is the resulting calculator output:

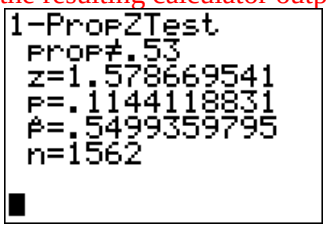


- Report the answer as an interval, in a form similar to (42.31%, 48.75%)
  (42.68%, 51.14%)
- Report the answer in a form similar to 45.53% ± 3.22%
  46.91% ± 4.23% (the margin of error can be found by subtracting the sample proportion from the upper end of the interval: 51.14% – 46.91%)

Exercise 2:

a. Use the calculator to test the claim that a population proportion is 53%. Use a two-tail test. Report the test statistic and the *p*-value, and state your conclusion. In the random sample, 859 of the 1562 surveyed answered "yes."

Here is the resulting calculator output:



Test statistic $z = 1.5787$, p-value = 0.1144, do not reject null hypothesis.