

Activity 3: Hypothesis Test for a Proportion

Using the same data from Activity 2, we will now conduct hypothesis testing and see if our conclusions are the same as in Activity 2 using confidence intervals.

We can use a z -test for a sample if it is a random sample from a population and if n (sample size) times p_0 (calculated proportion) as well as n times $(1 - p_0)$ are both at least 10.

1. Make sure these assumptions are true for all four treatments. Assume the study was a random sample for this data.

2. Now conduct a hypothesis test to see if the placebo and the nicotine patch only produce a statistically significant result.

a) Determine null and alternative hypotheses:

b) Use the calculator to perform the two sample z proportion hypothesis test.

z -value =

p -value =

c) What conclusions can you make and why?

3. Now conduct a hypothesis test to see if the Zyban only and the Zyban and nicotine patch together produce a statistically significant result.

a) Determine null and alternative hypotheses:

b) Use the calculator to perform the two sample z proportion hypothesis test.

z -value =

p -value =

c) What conclusions can you make and why?

4. Now conduct a hypothesis test to see if the nicotine patch only and Zyban only produce a statistically significant result.

a) Determine null and alternative hypotheses:

b) Use the calculator to perform the two sample z proportion hypothesis test.

z -value =

p -value =

c) What conclusions can you make and why?

5. Compare you hypothesis testing results from this activity with the results from activity 2.

Keystrokes for the fx-9750G Plus

From the Main Menu, press 2 for STAT.

If there are data in List 1, follow these directions:

- *Press F6 (make sure that the highlighted cell is List 1 by pressing the right/left arrow)*
- *Press F4 (delete all) then press F1 (yes)*

Calculate Hypothesis Tests for two sample Proportions: In the STAT mode

- Press F3 for Tests
- Press F1 for Z, then press F4 for 2-proportion
- Enter the alternative hypothesis
- Enter the number of participants not smoking after 6 months for x value since these are considered the "successes" in the proportion calculation.
- Enter the number of subjects for the n value since these are the considered the sample size in the proportion calculation.
- Press EXECUTE to calculate the confidence interval

Answers for 3rd quarter activities:

ACTIVITY 1. Answers will vary depending on data. The student social security number simulation should produce a uniform distribution. The means should produce a normal distribution and the mean and standard deviation of the means should be very close to the CLT values.

ACTIVITY 2:

1. a) .179 to .247
- b). .170 to .256
- c). .162 to .264
- d). .146 to .281

5. As the confidence level gets higher the width increases. As you try to be more accurate with the confidence level the width increases because of sampling error.

2. Placebo only: .127 to .248
- Nicotine patch: .162 to .264
- Zyban: .289 to .408
- Zyban and nicotine patch: .327 to .449

a) Zyban is effective. The two Zyban groups confidence intervals did not overlap the two groups not using Zyban.

b) The nicotine patch does not appear to be particularly effective. The placebo and the nicotine patch groups overlap so you cannot conclude the patch is better than the placebo.

c) There is also an overlap between the Zyban only and Zyban plus nicotine patch so you cannot conclude the patch helps the Zyban.

ACTIVITY 3:

1. Placebo: $.1875 \times 893 = 167.4$
- Nicotine patch only: $.213 \times 893 = 190.3$
- Zyban only : $.348 \times 893 = 311$
- Zyban and nicotine patch: $.388 \times 893 = 346$

2. a) $H_0: p_1 = p_2$

$H_a: p_1$ does not equal p_2

b) z-value = -.626

p-value = .53126

c) You can conclude that there is not a statistically significant difference between the placebo group and the nicotine patch group. The p-value is greater than .05.

3 a) $H_0: p_1 = p_2$

$H_a: p_1$ does not equal p_2

b) z-value = -.90313

p-value = .36645

c) You can conclude that there is not a statistically significant difference between the Zyban only and the Zyban with nicotine patch group. The p-value is greater than .05.

4. a) $H_0: p_1 = p_2$

$H_a: p_1$ does not equal p_2

b) z-value = -3.2948

p-value = .00098476

c) You can conclude that there is a statistically significant difference between the nicotine patch group and the Zyban group. The p-value is less than .01.

5. The hypothesis testing results and confidence interval results agree. They show that the Zyban appears to be effective in this study and that the nicotine patch does not appear to be effective.

