

## Part 2: Free Response

Communicate your thinking clearly and completely.

The U.S. Forest Service is considering additional restrictions on the number of vehicles allowed to enter Yellowstone National Park. To assess public reaction, the service asks a random sample of 150 visitors if they favor the proposal. Of these, 89 say "Yes."

8. Construct and interpret a 99% confidence interval for the proportion of all visitors to Yellowstone who favor the restrictions.

WE CONSTRUCT A 99% C.I FOR P, THE PROPORTION OF YELLOWSTONE VISITORS WHO FAVOR RESTRICTING THE NUMBER OF VEHICLES.

- OUR SAMPLE IS RANDOM, AND IT IS REASONABLE THAT  $150 < \frac{1}{10}$  (ALL VISITORS)
- $150 \left(\frac{89}{150}\right) = 89 > 10$  AND  $150 \left(\frac{61}{150}\right) = 61 > 10$ . SO,

THE 99% C.I IS  $(.49002, .69664)$ . WE ARE 99% CONFIDENT THAT THE PROPORTION WHO FAVOR THE RESTRICTIONS IS IN THIS INTERVAL.

9. Based on the survey results, can the U.S. Park Service conclude that more than half of all Yellowstone visitors are in favor of the added restrictions? Carry out an appropriate test.

WE TEST THE HYPOTHESES:  $H_0: p = .5$  VS  $H_a: p > .5$

THE TI-83 1-PROPZTEST:  $Z = 2.286$ ,  $P\text{-VALUE} = 0.011$ .

THE LOW P-VALUE MEANS WE HAVE SIGNIFICANT EVIDENCE AGAINST  $H_0$ . THAT IS THERE IS EVIDENCE TO SUPPORT THE CLAIM THAT MORE THAN  $\frac{1}{2}$  OF THE VISITORS FAVOR VEHICLE RESTRICTIONS.

When the antihistamine *Seldane* was first introduced, it was heavily promoted because it supposedly didn't cause drowsiness, unlike other antihistamines. A portion of the prescribing information for the drug is taken from an advertisement:

ADVERSE EVENTS REPORTED IN CLINICAL TRIALS		
Percent of Patients Reporting		
Adverse Event	Seldane (N = 781)	Placebo (N = 665)
Drowsiness	9.0	8.1

10. If we let  $p_1$  = the proportion of all people experiencing drowsiness who take Seldane, and let  $p_2$  = the proportion of all people experiencing drowsiness who take the placebo, then determine  $\hat{p}_1$  and  $\hat{p}_2$ . (Caution:  $\hat{p}_1$  is not 0.0115!)

$$\hat{p}_1 = .09, \quad \hat{p}_2 = 0.081$$

11. State appropriate hypotheses in symbols and words for carrying out a significance test.

WE TEST WHETHER THE DIFFERENCE IN PROPORTIONS,  $p_1 - p_2$ , IS GREATER THAN ZERO. THAT IS

$$H_0: p_1 = p_2$$

$$H_A: p_1 > p_2$$

NOTE:  $\hat{p} = \frac{70.29 + 53.865}{781 + 665} \approx 0.08586$

12. Verify the necessary conditions for performing inference in this setting.

• WE ASSUME AN SRS, • IT IS REASONABLE THAT  $781 < \frac{1}{10}$  (ALL PATIENTS TAKING SELDANE, AND  $665 < \frac{1}{10}$  OF ALL NOT TAKING SELDANE.

•  $n_1 \hat{p} = 67, n_1 \hat{q} = 713, n_2 \hat{p} = 57, n_2 \hat{q} = 607.9$  ALL  $> 5$ .

13. Calculate the test statistic and the P-value.

FROM TI-83 Z-PROPTTEST:  $z = 0.5703, P\text{-VALUE} = 0.284$

14. What conclusion would you draw? Explain.

SINCE THE LIKELIHOOD OF OBSERVING A DIFFERENCE OF PROPORTIONS AT LEAST THIS LARGE, ASSUMING THERE IS NO DIFFERENCE, IS ABOUT 28% (PRETTY LIKELY), WE DO NOT HAVE EVIDENCE THAT THERE IS A SIGNIFICANT DIFFERENCE IN THE PROPORTIONS OF THOSE EXPERIENCING DROWSINESS WITH SELDANE AND A PLACEBO.

I pledge that I have neither given nor received aid on this test.