

A sample case for a statistical analysis with a suggested solution

Case 2: Ethical Behavior of Business Students at Bayview University

During the global recession of 2008 and 2009, there were many accusations of unethical behavior by Wall Street executives, financial managers, and other corporate officers. At that time, an article appeared that suggested that part of the reason for such unethical business behavior may stem from the fact that cheating has become more prevalent among business students (*Chronicle of Higher education*, February 10, 2009). The article reported that 55 percent of business students admitted to cheating at some time during their academic career as compared to 47 percent of non-business students.

Cheating has been a concern of the dean of the College of Business at Bayview University for several years. Some faculty members in the college believe that cheating is more widespread in Bayview than at other universities, while other faculty members think that cheating is not a major problem in the college. To resolve some of these issues, the dean commissioned a study to assess the current behavior of business students at Bayview. As part of this study, an anonymous exit survey was administered to a sample of business students from this year's graduating class. Responses to the following questions were used to obtain data regarding three types of cheating.

- i. During your time at Bayview, did you ever present work copied off the Internet as your own?
Yes__ No__
- ii. During your time at Bayview, did you ever copy answers off another student's exam?
Yes__ No _____
- iii. During your time at Bayview, did you ever collaborate with other students on projects that were supposed to be completed individually?
Yes _____ No _____

Any student who answered **Yes** to one or more of these questions was considered to have been involved in some type of cheating.

Questions

1. Use descriptive statistics to summarize the data and comment on your findings.
2. Develop 95% confidence intervals for the proportion of all students, the proportion of male students, and the proportion of female students who were involved in some type of cheating.
3. Conduct a hypothesis test to determine if the proportion of business students at Bayview University who were involved in some type of cheating is less than that of business students at other institutions as reported by the Chronicle of higher education.
4. Conduct a hypothesis test to determine if the proportion of business students at Bayview University who were involved in some form of cheating is less than that of non-business students at other institutions as reported by the Chronicle of higher education.

Suggested solution

1. See the pivot tables created from the case 2 data set for partial answers.
2. 95% confidence intervals for the proportion of students that were involved in some type of cheating follow.

All Business Students

$$\bar{p} = .4111$$

$$\text{Margin of error} = z_{.025} \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 1.96 \sqrt{\frac{.4111(1-.4111)}{90}} = .1017$$

$$95\% \text{ Confidence interval: } .4111 \pm .1017 \text{ or } .3094 \text{ to } .5128$$

Male Students

$$\bar{p} = .4375$$

$$\text{Margin of error} = z_{.025} \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 1.96 \sqrt{\frac{.4375(1-.4375)}{48}} = .1403$$

$$95\% \text{ Confidence interval: } .4375 \pm .1403 \text{ or } .2972 \text{ to } .5778$$

Female Students

$$\bar{p} = .3810$$

$$\text{Margin of error} = z_{.025} \sqrt{\frac{\bar{p}(1-\bar{p})}{n}} = 1.96 \sqrt{\frac{.3810(1-.3810)}{42}} = .1469$$

$$95\% \text{ Confidence interval: } .3810 \pm .1469 \text{ or } .2341 \text{ to } .5279$$

3. The *Chronicle of Higher Education* reported that the proportion of business students who admitted to some form of cheating was .56. Since we are interested in testing to see if the population proportion of business students at Bayview who admitted to some form of cheating is less than business students at other universities, we are looking for evidence that p , the population proportion, is less than .56. Thus, the appropriate hypothesis test is

$$H_0 : p \geq .56$$

$$H_a : p < .56$$

We will use $\alpha = .05$.

$$\bar{p} = .4111 \text{ and } \sigma_{\bar{p}} = \sqrt{\frac{p_0(1-p_0)}{n}} = \sqrt{\frac{.56(1-.56)}{90}} = .0523$$

$$z = \frac{\bar{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{.4111 - .56}{.0523} = -2.85$$

Since the test statistic is in the lower tail, the p -value is the area under the curve for $z \leq -2.85$. Using the standard normal probability table, the p -value = .0022

Because the p -value = .0022 $\leq$.05 we reject H_0 and conclude that the ethical behavior of students at Bayview University (with respect to cheating) is better than for business schools at other universities.

4. The *Chronicle of Higher Education* reported that the proportion of non-business students who admitted to some form of cheating was .47. Since we are interested in testing to see if the population proportion of business students at Bayview who admitted to some form of cheating is less than non-business students at other universities, we are looking for evidence that p , the population proportion, is less than .47. Thus, the appropriate hypothesis test is

$$H_0 : p \geq .47$$

$$H_a : p < .47$$

We will use $\alpha = .05$.

$$\bar{p} = .4111 \text{ and } \sigma_{\bar{p}} = \sqrt{\frac{p_0(1-p_0)}{n}} = \sqrt{\frac{.47(1-.47)}{90}} = .0526$$

$$z = \frac{\bar{p} - p_0}{\sqrt{\frac{p_0(1-p_0)}{n}}} = \frac{.4111 - .47}{.0526} = -1.12$$

Since the test statistic is in the lower tail, the p -value is the area under the curve for $z \leq -1.12$.

Using the standard normal probability table, the p -value = .1314

Because the p -value = .1314 $>$.05 we cannot reject H_0 .

There is not sufficient evidence to conclude that the ethical behavior of students at Bayview University (with respect to cheating) is better than for non-business students at other universities.