

Q1: A statistics professor asked her students whether or not they were fans of Taylor Swift. In a sample of 50 of her students (randomly sampled from her 700 students), 35 said they were fans.

- A. Find a 95% confidence interval for the true proportion of the professor's students who were registered to vote. (Make sure to check any necessary conditions and to state a conclusion in the context of the problem.)

B. Explain what 95% confidence means in this context.

C. According to an online poll, about 73% of 18- to 29-year-olds said that they were fans. Does the 73% figure seem reasonable for the professor's students? Explain.

Q2: Herpetologists (snake specialists) found that a certain species of reticulated python have an average length of 20.5 feet with a standard deviation of 2.3 feet. The scientists collect a random sample of 30 adult pythons and measure their lengths.

A. Describe the sampling distribution (shape, center, spread) of this sample mean.

B. What conditions need to be satisfied for your answer on part (a) to be correct?

- C. In their sample, the mean length was 19.5 feet long. One of the herpetologists fears that pollution might be affecting the natural growth of the pythons. Do you think this sample result is unusually small? Explain.

Q3: A report on health care in the United States said that 28% of Americans have experienced times when they haven't been able to afford medical care. A news organization randomly sampled 801 black Americans, of whom 38% reported that there had been times in the last year when they had not been able to afford medical care. Does this indicate that this problem is more severe among black Americans?

A. Test an appropriate hypothesis and state your conclusion. (Make sure to check any necessary conditions and to state a conclusion in the context of the problem.)

B. Was your test one-tail upper tail, one-tail lower tail, or two-tail? Explain why you chose that kind of test in this situation.

C. Explain what your P-value means in this context.

Q4: A company manufacturing computer chips finds that 8% of all chips manufactured are defective. Management is concerned that employee inattention is partially responsible for the high defect rate. In an effort to decrease the percentage of defective chips, management decides to offer incentives to employees who have lower defect rates on their shifts. The incentive program is instituted for one month. If successful, the company will continue with the incentive program.

- A. Write the company's null and alternative hypotheses.
- B. In this context describe a Type I error and the impact such an error would have on the company.
- C. In this context describe a Type II error and the impact such an error would have on the company.
- D. Based on the data they collected during the trial program, management found that a 95% confidence interval for the percentage of defective chips was (5.0%, 7.0%). What conclusion should management reach about the new incentive program? Explain.
- E. What level of significance did management use?

- F. Describe to management an advantage and disadvantage of using a 1% alpha level of significance instead.
- G. Management decided to extend the incentive program so that the decision can be made on three months of data instead. Will the power increase, decrease, or remain the same? Why?
- H. Over the trial month, 6% of the computer chips manufactured were defective. Management decided that this decrease was significant. Why might management choose not to permanently institute the employee incentive program?

Q5: The adoption of smart phones and social media apps has been much discussed. One aspect of these devices is that students tend to be distracted by their phones during class. A recent survey reported that 86% of 1004 randomly sampled females used their smart phones during class time, compared to 81% of 1009 randomly sampled males. Do these results confirm a higher smart phone usage by females?

A. Test an appropriate hypothesis and state your conclusions.



B. Find a 99% confidence interval for the difference in the proportion of males and females who use their phone during class (you can use the critical value 2.58). Interpret your interval.

C. If you were a school administrator, how meaningful would you find this data? Would the results be enough for you to design a new policy?