

Hypothesis Testing #1
1-Sample Confidence Intervals

1. **Cloning:** A May 2002 Gallup Poll found that only 8% of a random sample of 1012 adults approved of attempts to clone a human.
 - a.) Find the margin of error for this poll if we want 95% confidence in our estimate of the percent of American adults who approve of cloning humans.
 - b.) Explain what that margin of error means.
 - c.) If we only need to be 90% confident, will the margin of error be larger or smaller? Explain.
 - d.) Find that margin of error.
 - e.) In general, if all other aspects of the situation remain the same, would smaller samples produce smaller or larger margins of error?

2. **Junk mail:** Direct mail advertisers send solicitations (a.k.a. junk mail) to thousands of potential customers in the hope that some will buy the company's product. The response rate is usually quite low. Suppose a company wants to test the response to a new flyer, and sends it to 1000 people randomly selected from their mailing list of over 200,000 people. They get orders from 123 of the recipients.
 - a.) Create a 90% confidence interval for the percentage of people the company contacts who may buy something.
 - b.) Explain what "90% confidence" means
 - c.) The company must decide whether to now do a mass mailing. The mailing won't be cost-effective unless it produces at least a 5% return. What does your confidence interval suggest? Explain.

3. **Parking:** Hoping to lure more shoppers downtown, a city builds a new public parking garage in the central business district. The city plans to pay for the structure through parking fees. During a two-month period (44 weekdays), daily fees collected averaged \$126 with a standard deviation of \$15.
 - a.) Construct a 90% confidence interval for the mean daily income this parking garage will generate.

4. **Local News.** The mayor of a small city has suggested that the state locate a new prison there, arguing that the construction project and resulting jobs will be good for the local economy. A total of 183 residents show up for a public hearing on the proposal, and a show of hands finds only 31 in favor of the prison project. What can the city council conclude about public support for the mayor's initiative?

5. **Drinking:** A national health organization warns that 30% of middle school students nationwide have been drunk. Concerned, a local health agency randomly and anonymously surveys 110 of the 1212 middle school students in its city. Only 21 of them report having been drunk.
 - a.) What proportion of the sample reported having been drunk?
 - b.) Does this mean that this city's youth are not drinking as much as the national data would indicate? Explain.
 - c.) Create a 95% confidence interval for the proportion for the city's middle school students who have been drunk.
 - d.) Is there any reason to believe that the national level of 30% is not true of the middle school students in this city?

6. **Deer Ticks** Wildlife biologists inspect 153 deer taken by hunters and find 32 of them carrying ticks that test positive for Lyme disease.
- Create a 90% confidence interval for the percentage of deer that may carry such ticks.
 - If the scientists want the margin of error to be no more than 3%, how many deer should they sample?
7. **Ruffles:** Students investigating the packaging of potato chips purchased 6 bags of Lay's Ruffles marked with a net weight of 28.3 grams. They carefully weighed the contents of each bag, recording the following weights (in grams): 29.3, 28.2, 29.1, 28.7, 28.9, 28.5
- Create a 95% confidence interval for the mean weight of the bags of Ruffles potato chips
 - Comment on the company's stated net weight of 28.3 grams
8. **Gambling** A city ballot includes a local initiative that would legalize gambling. The issue is hotly contested, and two groups decide to conduct polls to predict the outcome. The local newspaper finds that 53% of 1200 randomly selected voters plan to vote "yes", while a college Statistics class finds 54% of 450 randomly selected voters in support. Both groups will create 95% confidence intervals.
- Without finding the confidence intervals, explain which one will have the larger margin of error.
 - Find both confidence intervals.
 - Which group concludes that the outcome is too close to call? Why?
9. **Chips Ahoy:** In 1998, as an advertising campaign, the Nabisco Company announced a "1000 Chips Challenge", claiming that every 18-ounce bag of their Chips Ahoy cookies contained at least 1000 chocolate chips. Dedicated Statistics students at the Air Force Academy (no kidding!) purchased some randomly selected bags of cookies, and counted the chocolate chips. Some of their data are given below. (*Chance*, 12, no.1 [1999])

1219	1214	1087	1200	1419	1121	1325	1345
1244	1258	1356	1132	1191	1270	1295	1135

- Create a 95% confidence interval for the average number of chips in bags of Chips Ahoy cookies
- What does this evidence say about Nabisco's claim?