

More examples on Confidence Interval and Hypothesis Testing

1. Answer two questions for the given sample data below .

	Population1	Population2
n	15	15
\bar{x}	15.3	14.2
s	3.2	3.5

(a) Test the claim that $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 \neq \mu_2$ at the significance level of $\alpha = 0.05$.

(b) Construct a 95% confidence interval about $\mu_1 - \mu_2$.

2. Answer two questions for the given sample data below .

	Population1	Population2
n	20	20
\bar{x}	111	104
s	8.6	9.2

(a) Test the claim that $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 \neq \mu_2$ at the significance level of $\alpha = 0.05$.

(b) Construct a 95% confidence interval about $\mu_1 - \mu_2$.

3. Answer two questions for the given sample data below .

	Population1	Population2
n	25	18
\bar{x}	50.2	42.0
s	6.4	9.9

(a) Test the claim that $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 > \mu_2$ at the significance level of $\alpha = 0.10$.

(b) Construct a 90% confidence interval about $\mu_1 - \mu_2$.

4. Answer two questions for the given sample data below .

	Population1	Population2
n	32	25
\bar{x}	103.4	114.2
s	12.3	13.2

(a) Test the claim that $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 < \mu_2$ at the significance level of $\alpha = 0.10$.

(b) Construct a 90% confidence interval about $\mu_1 - \mu_2$.

5. Answer two questions for the given sample data below .

	Population1	Population2
n	23	13
\bar{x}	43.1	41.0
s	4.5	5.1

(a) Test the claim that $H_0 : \mu_1 = \mu_2$ vs $H_1 : \mu_1 > \mu_2$ at the significance level of $\alpha = 0.05$.

(b) Construct a 95% confidence interval about $\mu_1 - \mu_2$.

6. In a poll conducted March 17-21, 2005, by the Pew Research Center for the People and the Press, a simple random sample of 1505 American adults was asked whether they were in favor of tighter enforcement of government rules on TV content during hours when children are most likely to be watching. Of the 1505 adults, 1129 responded yes.

(a) Obtain a 95% confidence interval for the proportion of Americans who are in favor of tighter enforcement of government rules on TV content.

(b) Interpret the confidence interval in the context of the problem and in statistical way.

7. A school administrator is concerned about the amount of credit card debt college students have. She wishes to estimate the percentage of full-time college students who have credit card debt of \$2000 or more. Of 1270 she surveyed, there are 431 college students who have credit card debt of \$2000 or more.

(a) Find the 90% confidence interval of the percentage of college students who have credit card debt of \$2000 or more.

(b) Find the 95% confidence interval of the percentage of college students who have credit card debt of \$2000 or more. Interpret the confidence interval in practical way.

(c) What is the effect of increasing the level of confidence on the width of confidence interval?

8. In clinical trials of Nasonex, 750 randomly selected pediatric patients (ages 3 to 11 years old) were randomly divided into two groups. The patients in Group 1 (experimental group) received 100 mcg of Nasonex, while the patients in Group 2 (Control group) received a placebo. Of the 374 patients

in the experimental group, 64 reported headaches as a side effect. Of the 376 patients in the control group, 68 reported headaches as a side effect.

- (a) Test the claim that the proportion of Nasonex users that experienced headaches as a side effect in experimental group is greater than the proportion in control group.

- (b) Construct a 90% confidence interval for the difference between the two population proportions, $p_1 - p_2$. Interpret the confidence interval in the practical way.

9. Life on Mars? On March 19-21,1999, The Gallup organization surveyed 535 adults aged 18 years old or older and asked, "Do you think there is life of some form on other planets in the universe or not?" Of the 535 individuals surveyed, 326 responded yes. When the same question was asked on September 3-5, 1996, 385 of the 535 individuals surveyed responded yes.

- (a) Test the claim that the proportion of adults who believe that there is life on other planets has decreased since September 3-5,1996 at the $\alpha = 0.10$ level of significance.

- (b) Construct a 90% confidence interval of the difference between the two population proportions, $p_{1996} - p_{1999}$. Interpret the result interval in practical way.

10. An engineer wanted to know whether the strength of two different concrete mixture designs differed significantly. He randomly selected 9 cylinders, measuring 6 inches in diameter and 12 inches in height, into which mixture 67-0-301 was poured. After 28 days, he measured the strength of the cylinder. He also randomly selected 10 cylinders of mixture 67-0-400 and performed the same test. The results are as follows:

Mixture 67-0-301	3960	4090	3100	3830	3200	3780	4080	4040	2940	
Mixture 67-0-400	4070	4890	5020	4330	4640	5220	4190	3730	4120	4620

- (a) Test the claim that mixture 67-0-400 is stronger than mixture 67-0-301 at the significance level of $\alpha = 0.05$.
- (b) Construct a 95% confidence interval of the population mean difference, $\mu_{400} - \mu_{301}$ and interpret your results.

11. Nielsen Media Research reported that adult women watch TV an average of 5 hours and 1 minute (301 minutes) per day, compared to an average of 4 hours and 17 minutes (257 minutes) for adult men. These results are found from a sample of 100 men and 100 women and the two groups have the same standard deviation of 57 minutes. Construct a 99% confidence interval for the difference $\mu_1 - \mu_2$, where μ_1 and μ_2 are the means for adult women and men, respectively. Does the confidence interval contain zero? Does this suggest that there is or is not a significant difference between the two means? If there is a significant difference, describe that difference.

12. According to the Center of Disease Control, the mean number of cigarettes smoker per day by individuals who are daily smokers is 18.1. A research claims that retired adults smokes less than the general population of daily smokers. To test this claim, she obtains a random sample of 40 retired adults who are current smokers and records the number of cigarettes smoked on a randomly selected day. The data result in a sample mean of 16.8 cigarettes and a standard deviation of 4.7 cigarettes. Is there sufficient evidence at the $\alpha = 0.01$ level of significance to support the claim that retired adults who are daily smoked smoke less than the general population of daily smokers?

13. In a Gallup Poll conducted May 20-22, 2005, 785 of 1006 adults aged 18 or older said they had read at least one book during the previous year. In December 1990, 81% if adults aged 18 or older had read at least one book during the previous year. Is there sufficient evidence to support the claim that the percent of adults who have read at least one book in 2005 is different from 1990 at the $\alpha = 0.05$ significance level? If yes, find a 95% confidence interval for the percentage, p ?